A webcomic of romance, sarcasm, math, and language

xkcd

RANDALL MUNROE

2015

xkcd

2015

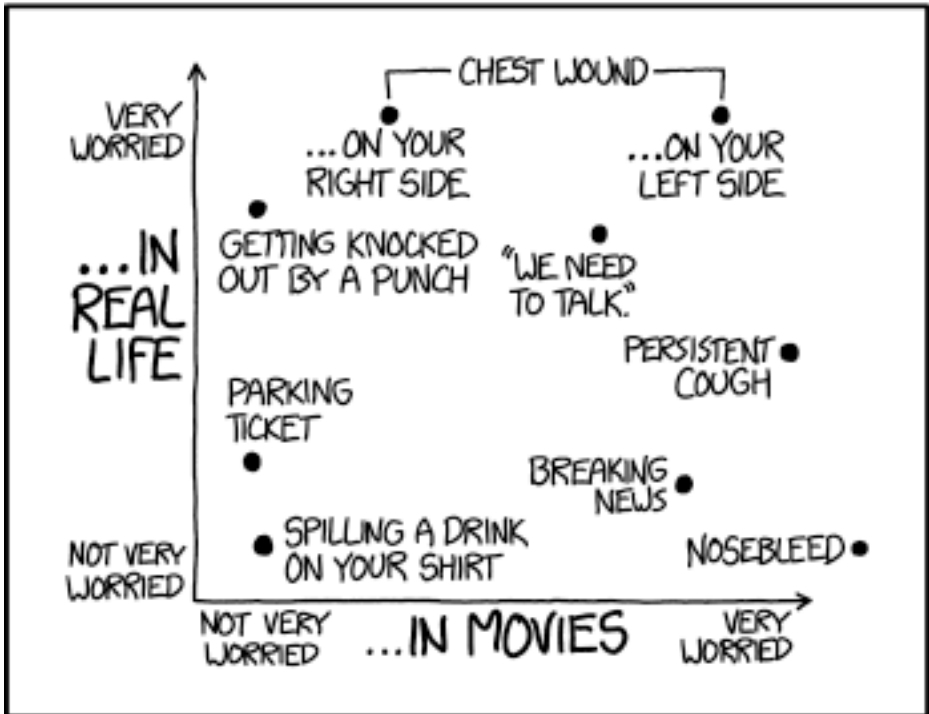a collection of 156 webcomics

from #1468 to #1623

by Randall Munroe

If the breaking news is about an event at a hospital or a lab, move it all the way over to the right.

Explanation

This chart is a visual representation of how worried people should be by various events in real life compared to the same events in movies, based on the likelihood of the event causing serious harm. In effect, it's poking fun at various cliches and the emphasis on dramatic flair, regardless of realism. The chart's Y-axis indicates how worrying an event is in real life (from "not very worried" to "very worried"), while its X-axis shows how worrying the event is in movies. Nine events are shown in the chart, all of them cliches in the medium of film:

- Spilling a drink on your shirt: In both real life and in movies, this just causes a stain and maybe a little embarrassment, with the worst case scenario of the shirt being expensive.

- Nosebleed: Nosebleeds are common in real life, as they can result from even a mild impact to the face, or even dried out sinuses. There are some conditions where nosebleeds can indicate something more serious (such as a stroke, or radiation poisoning), but those are vastly outnumbered by bleeds that are relatively harmless. Unless there's a reason to believe that a nosebleed is connected to something else, they rarely even require medical attention. Nosebleeds in movies are almost always a sign that something is seriously wrong - the common, mundane nosebleeds almost never come up.

- Breaking news: People in real life commonly don't pay much attention to the news at all, so many breaking

stories go unnoticed until much later. Most breaking news stories are also about non-threatening events (e.g. presidential addresses) or events that are far removed from the viewer. However, in movies, "breaking news" broadcasts are almost always a means to introduce a significant plot element which directly impact the protagonists, and are usually very serious events, sometimes about the protagonist. XKCD has referenced news reports as foreshadowing before.

- Parking ticket: Tickets in movies are almost always ignored, but in real life, they are moderately worrying because they cost quite a bit of money and can tarnish your driving record.

- Persistent cough: In real life, coughing fits can be a sign of serious illness, and are worth having checked out, but the large majority of them indicate only minor and common illnesses. In movies, just like with nosebleeds, a persistent cough almost always indicates a potentially deadly disease.

- "We need to talk.": This phrase is a common, stereotypical lead-in to a serious conversation, usually about a couple's relationship status. In real life, as in the movies, prefacing a conversation with that phrase indicate that something serious, and possibly very upsetting, is about to be discussed. Such conversations are rarely deadly, but are often upsetting.

- Getting knocked out by a punch: In movies, a character who is knocked out by a punch always wakes up sometime later with no lasting effects, making it less cause for concern than a spilled drink. In real life, being

rendered unconscious by a physical impact is extremely serious, it can result in a variety of permanent impacts, such as concussions, up to and including brain damage and even death.

- Chest wounds: The chart mentions wounds on both your right and left sides. In real life, a chest wound to either side is extremely worrying. But in movies, getting wounded on the right side of the chest will rarely deal lasting damage to the hero or primary villain, to show how badass they are. Wounds on the left side of the chest generally signify swift death. This is likely due to the common misconception that the heart is on the left side of the chest - it is actually in the center, with a slight tendency to the left. However, even left-side chest wounds in movies are apparently still less worrisome than coughs and nosebleeds. It must also be noted that the term "chest wound" is broader than what the author of the comic appears to mean. More narrow terms of "thoracic gunshot wound", "gunshot chest wound", "thoracic ballistic trauma" or "penetrating chest wound" (the latter is slightly broader and includes the damage inflicted by blades and other impaled objects) would be more appropriate because just a "chest wound" includes such insignificant events as minor skin cuts in the chest area.

The title text expands on the aforementioned breaking news reports. While already overly worrying whenever they occur in movies compared to real life, should the movie's news report cover an event at a hospital (usually an outbreak of some major disease) or a laboratory (a

monster escaping, a toxic gas released, an explosion, etc.), these events are universally much more worrisome than any other type of news story since they are guaranteed to be important for the protagonists in short order. In real life, breaking news from such locations may be more likely to be serious, but are still very unlikely to impact the viewer directly.

#1469: UV

January 05, 2015
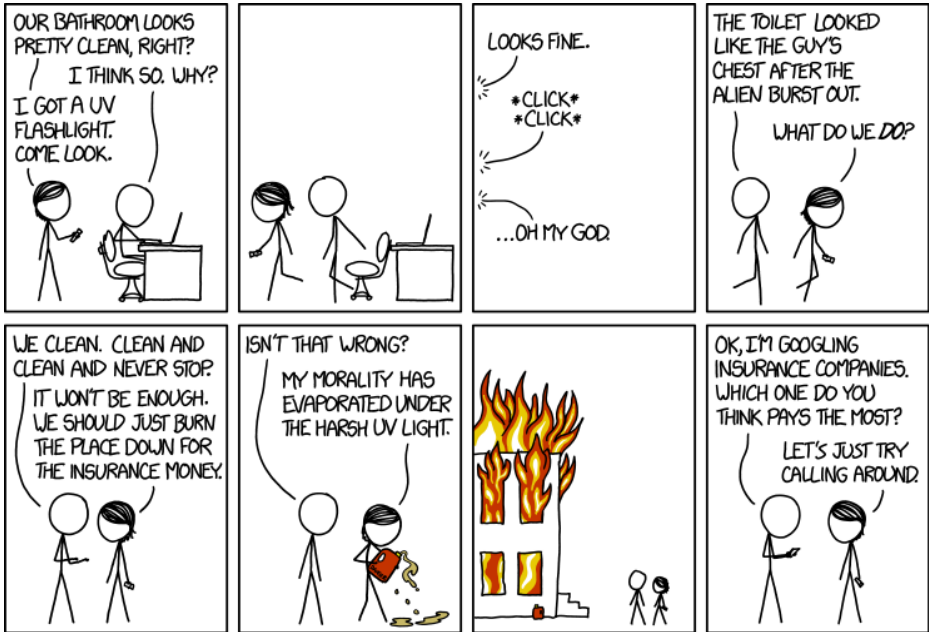
Hey, why stop at our house? We could burn down ALL these houses for the insurance money.

Explanation

Ultraviolet light (abbreviated UV light, as in the title of the comic) is a kind of light that is slightly more energetic than the light in the visible portion of the electromagnetic spectrum. Ultraviolet light is normally by itself invisible to human eye, but can induce fluorescence (glowing) of certain organic molecules. A UV flashlight can thus be a means to detect small amounts of blood, semen, and urine on surfaces.

The first part of this comic focuses on Megan showing off her new UV flashlight to Cueball by revealing how disgusting their bathroom appears in UV light despite how clean it appears normally. She manages this due to UV light's special property of causing chemicals in urine to glow. Both Cueball and Megan are horrified by their discovery. This is a common reaction in the face of more sensitive diagnostic tests. Cueball's comment is a reference to the 1979 sci-fi film Alien.

In the second part of the comic they realize that their house will never be clean enough. So Megan resolves to burn down the house for the insurance money (i.e. insurance fraud). Cueball is in doubt, but Megan apparently has no morality left. She even proclaims this while pouring some dangerous liquid, probably gasoline, on to the floor of their apartment.

The last panel of the comic implies that the two hadn't purchased fire insurance beforehand, and plan on

purchasing it now, only to make a claim immediately afterwards. At this point Cueball has been won over by Megan's plan and tries to help by searching for insurance companies using Google. They wish to find the company that pays out the most. This plan will almost certainly not work since insurance typically only covers events that begin after purchasing the insurance, and does not cover anything that happens before purchasing the insurance, or that is intentionally caused.

The title text shows just how distorted Megan's and Cueball's thinking has become, as one of them suggests burning down all the houses in order to claim the insurance money for them. This plan will also not work. Even if insurance has been purchased for these other homes, the insurance companies will pay the owners of those homes, not Cueball and Megan. Instead, Cueball and Megan would likely be arrested for multiple charges of arson and end up in prison for a very long time.

The take home message of this comic must be: Never use a UV light in your bathroom. Maybe Randall did this by mistake causing the creation of this comic. (Randall has previously warned people about similar diagnostics in 860: Never Do This.)

#1470: Kix

January 07, 2015
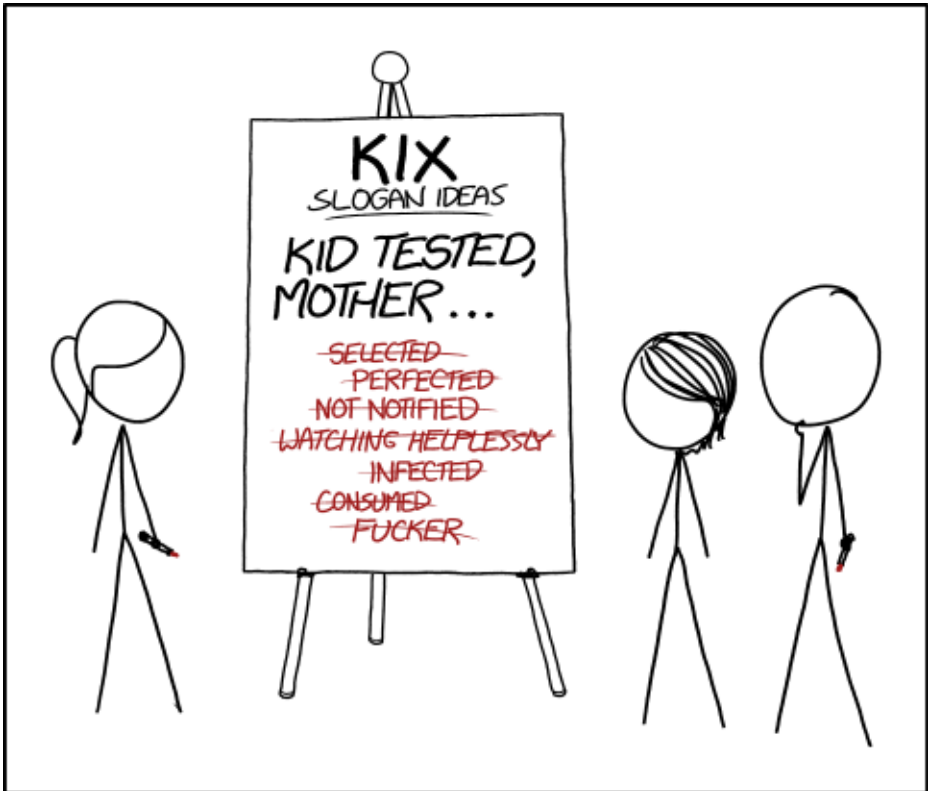
My parents sent me to several years of intensive Kix test prep.

Explanation

Kix is an American brand of cold breakfast cereal made of extruded and expanded cornmeal. Its slogan, "Kid tested, Mother approved," is well known in the United States. However, in this brainstorming session, the word "Approved" has apparently not yet been considered. A number of possible words and phrases for the ending have been presented and stricken out, indicating that they were rejected; each one causes the slogan to be subject to increasingly absurd and comedic interpretations:
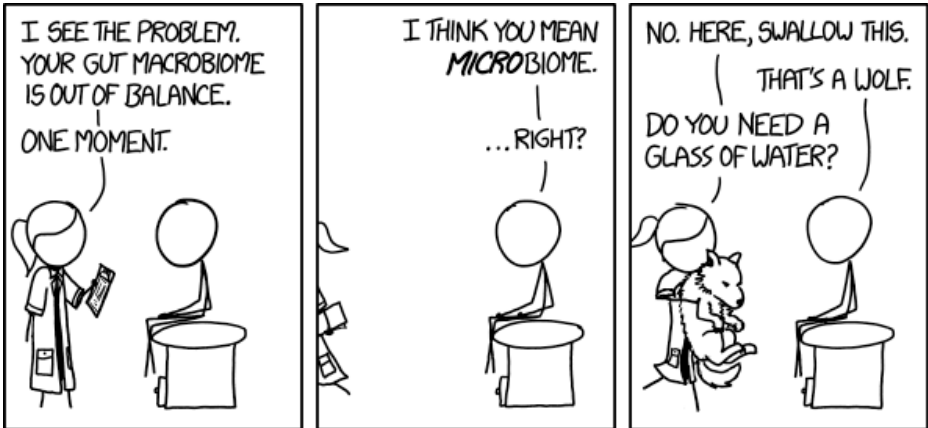
The title text conflates the phrase "Kid tested" with college entrance exams such as the Standardized Aptitude Test (SAT) or the ACT. Instead of stating that a child tasted the cereal and gave their opinion on its quality, the cereal itself is an academic subject on which the child was tested. Randall, referring to how some parents enroll their children in special classes or schools to prepare them to score well in this type of test, states that his parents extensively prepared him for a college entrance exam about Kix cereal.

This comic may be a commentary about the uselessness of brainstorming sessions or the bad ideas that come out of them, as they are often started with the phrase "there are no bad ideas". As the brainstorming session continues the original meaning of the slogan is lost, much like a game of telephone, and the session becomes less productive.

Cereal advertising has previously been referenced in 38: Apple Jacks.

#1471: Gut Fauna

January 09, 2015

Panel 1:
I SEE THE PROBLEM. YOUR GUT MACROBIOME IS OUT OF BALANCE.

ONE MOMENT.

Panel 2:
I THINK YOU MEAN *MICRO*BIOME.

...RIGHT?

Panel 3:
NO. HERE, SWALLOW THIS.

THAT'S A WOLF.

DO YOU NEED A GLASS OF WATER?

I know it seems unpleasant, but of the two ways we typically transfer them, I promise this is the one you want.

Explanation

The gut microbiome is the collection of bacteria that reside in the human digestive tract. The bacteria perform several vital digestive and immune-support functions. Different compositions of bacteria, collectively referred to as gut flora, can be linked to risk of some diseases, while other compositions are linked to a decreased risk of some diseases and are therefore called "good bacteria". The title "Gut fauna" is a play on words. Fauna means animal life in Latin, and flora means vegetable life. However, in this context flora means bacterial life because, when microscopes were invented, microbial life was considered to be non-animal and therefore classified as "flora". For a good description of the microbiome see The Invisible Universe Of The Human Microbiome.

In this comic, Cueball is visiting a doctor (Ponytail) for some unknown problem. The doctor informs him that his gut macrobiome is out of balance, which Cueball responds to with confusion over whether or not she meant the microbiome or macrobiome. A macrobiome, instead of being composed of small organisms such as bacteria, would be composed of larger organisms such as mammals. The phrase "gut fauna" would refer to any animals living inside a gut (as the word fauna refers to animals living in an ecosystem).

Cueball is right to be worried by the doctor's reference to his macrobiome, as normal humans shouldn't have large animals living inside them[citation needed] with the

exception of some parasites such as Helminths or Cestoda, or in some cases, the consumption of live animals such as octopus, shrimp and eels. No animals belong natively in the human digestive system; all known cases of animals living permanently in the human digestive system are causes of disease. His fear is compounded when the doctor prescribes one wolf for Cueball to swallow, which is normally impossible for average humans and would, at the very least, result in major interior (or exterior) damage to Cueball and (possibly) Ponytail when the wolf resists being swallowed. Needless to say this is not common physician practice due to the likely death rate and the impossiblity of the wolf fitting inside the human stomach.[citation needed] Also, if the transfer were somehow successful, the wolf would quickly die, defeating the purpose of the procedure.

The choice of a wolf echoes the reintroduction of the animals into the macrobiome of Yellowstone National Park in the United States, where they have improved the balance by, in part, preying on elk and reducing the damage caused by their grazing.

The dialog between the characters ends with the doctor asking the patient whether he needs a glass of water, a typical question asked by health professionals (water can help patients swallow oral medication). This last phrase further extends the humorous nature of the proposition to swallow the wolf by displaying a confidence of the doctor in her choice of the treatment modality. In reality, of course, drinking a glass of water while attempting to

swallow a wolf would make the latter procedure neither easier, nor more feasible.

The title text suggests that swallowing the wolf is not the worst situation that could have occurred, as the doctor refers to "another way" that the wolf could be administered. One typical way that microbiomes are restored is through fecal bacteriotherapy, most easily described as a "poop transfer". It could also mean transferred via suppository. In either case, the worse "other way" that the doctor is referring to is thus likely the rectal route, which (for Randall) is less preferable than attempting to swallow a live wolf. However, either way would prove physically impossible and/or lethal.

If we are to take the doctor at her word that there is indeed some sort of macrobiome inside Cueball's gut, then perhaps she has some kind of matter compression ability that would make introducing a live wolf a legitimate therapeutic option.

Randall has referenced wolf reintroduction programs before, in comic 819: Five-Minute Comics: Part 1.
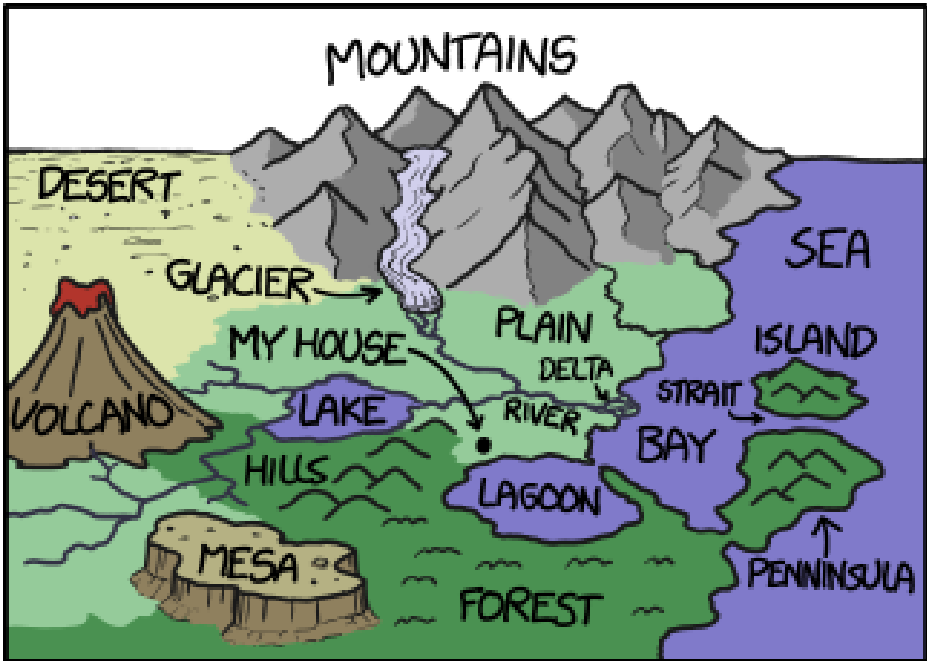
IF I COULD LIVE ANYWHERE, I WOULD CHOOSE THE EXAMPLE MAP FROM GEOGRAPHY BOOKS THAT EXPLAINS WHAT EVERYTHING IS CALLED.

The place I'd least like to live is the farm in the background of those diagrams showing how tornadoes form.

Explanation

The comic is a map showing examples of geographical features as they would be presented in a geography textbook. May be based on the first page of the book You Choose which displays a map of locations similar in style to the one used in the comic and asks the reader "If you could go anywhere, where would you go?".

Randall notes that he would like to live in the middle of this region. These maps include an unusual density of different land forms, leading to an interesting environment in which to live. In the real world, these geographical features might take up far more space, and the geologic forces that shape them might create far different patterns than those shown. This kind of Neverland of geographical feature would offer a range of outdoor activities and landscapes that would make it a very nice place to live, as long as the volcano does not erupt.

Some of the geographic features do have a (very) loose similarity to the area around Boston, where Randall lives. Also near Boston is one geographical feature that Randall has included in this map but has refrained from labeling, the isthmus between the peninsula and the forest.

On the other hand, the map actually looks quite a bit like the area around southwestern Washington and northwestern Oregon, with the reader facing south so the high desert is on the upper left. The volcano could be

Rainier or St. Helens. Real-world outdoor enthusiasts do indeed appreciate the Neverlandish landscape. Having little Spanish influence, locals would refer to a "mesa" as a butte.

The title text discusses a different type of diagram usually found in geography textbooks, the one showing the mechanism of tornado formation. Randall notes that he would least like to live in the farm typically depicted in the background of such diagrams. This is likely because the farm is depicted as being on a vast, featureless stretch of flat prairie, the opposite of the rich landscape in the comic. The monotonous landscape would reflect that of Tornado Alley, an area of the central United States where a large number of tornadoes form, and which makes up a large portion of the Great Plains. His dislike for this type of area may also simply be due to the damage created when a tornado hits. That said, chances of a direct tornado hit on any given house are slim compared to simply the risk of property damage. Living near an active volcano may be much more dangerous than living in Tornado Alley. Tornadoes are a recurring subject on xkcd.

Here is an alphabetical list of the different land forms with wiki links:

Bay, Desert, Forest, Glacier, Hills, Island, Lagoon, Lake, Mesa, Mountains, Peninsula, Plain, Delta, River, Sea, Strait and Volcano.

#1473: Location Sharing

January 14, 2015
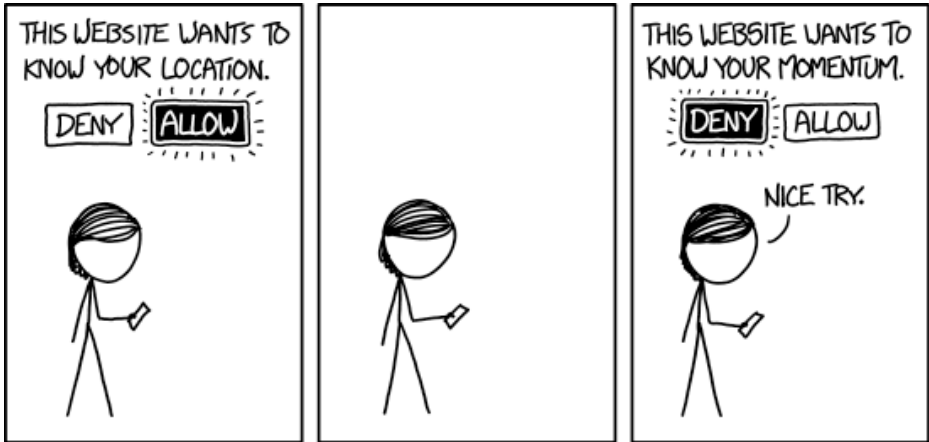
Our phones must have great angular momentum sensors because the compasses really suck.

Explanation

In this comic, Megan is visiting a website on her mobile phone. After loading it, the website asks for her location. The choice between allowing or denying a website or app access to certain information is common among smartphones. The term "location sharing" specifically refers to when a smartphone user shares their location with such an entity. An example is a weather app which would need your location in order to automatically find the correct forecast.

Megan is then asked her momentum, which she denies. The joke is based on the Heisenberg uncertainty principle, which, in quantum mechanics, states that some pairs of values cannot be known precisely and simultaneously. The most famous example of such values (and the example Heisenberg himself used) are location and momentum: the more precisely you measure the location of a particle, the less certain you are of its momentum, and vice versa.

Heisenberg's uncertainty principle is typically observed only at sub-atomic scales, and not at macroscopic scales (it is possible to measure both the position and momentum of a large object such as a smartphone or human being). Nonetheless, Megan refuses, actively enforcing the uncertainty principle as a conscious action rather than as a simple limitation of knowledge.

The title text refers to the inclusion of gyroscopes in

modern cell phones that measure angular momentum, mostly to detect when the phone is tilted, but also used in a few mobile games. Randall suggests the poor accuracy of the compasses in mobile phones (measuring the angular position) is due to the gyroscopes being too good. If both the gyroscope and the compasses were completely accurate to a subatomic scale, it would violate the uncertainty principle. Modern phones also include varied technologies (such as GPS) to pinpoint the user's location, with varying degrees of accuracy.

The uncertainty principle has previously been referenced in 824: Guest Week: Bill Amend (FoxTrot). It has also been discussed in relation to the two comics 1404: Quantum Vacuum Virtual Plasma and 1416: Pixels.

#1474: Screws
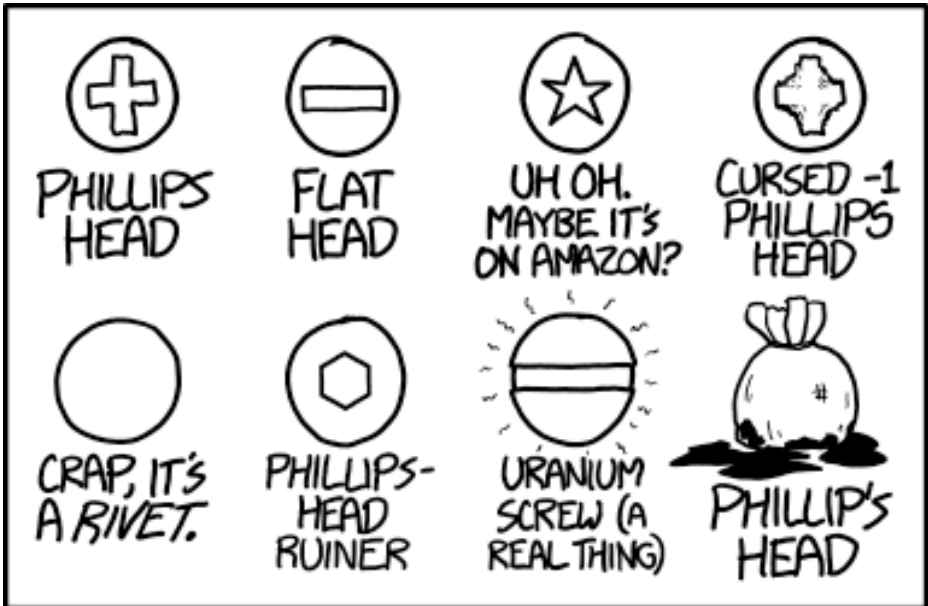
If you encounter a hex bolt, but you only brought screwdrivers, you can try sandwiching the head of the bolt between two parallel screwdriver shafts, squeezing the screwdrivers together with a hand at either end, then twisting. It doesn't work and it's a great way to hurt yourself, but you can try it!
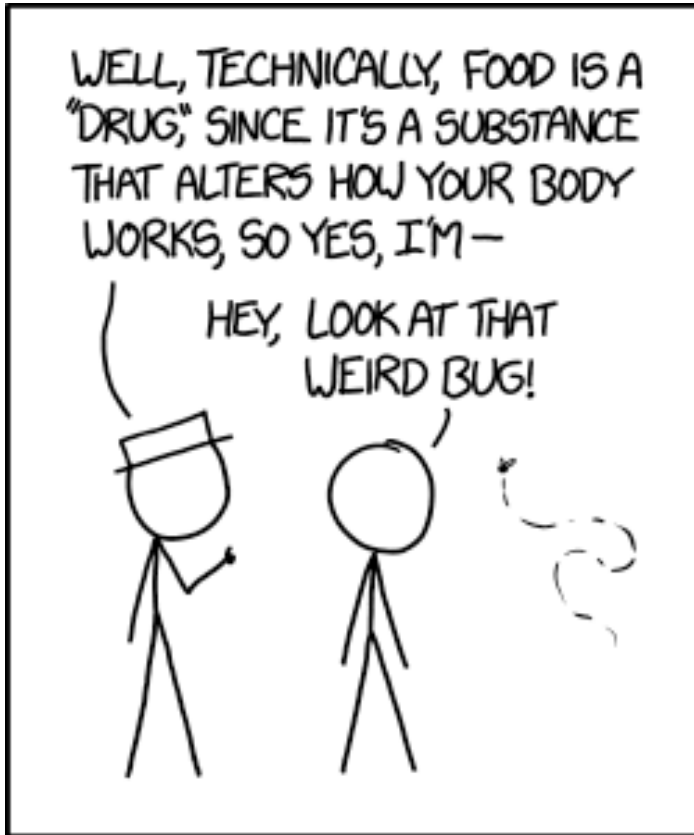
Explanation

This comic uses a similar structure and is based off of the same idea as 1714: Volcano Types and 1874: Geologic Faults. Appliance makers sometimes use strange screw heads to hinder attempts from users to remove appliance covers. Users usually have handy screwdrivers for the first two screw types drawn, Phillips and Flat. More advanced users usually have some less standard drivers, such as Torx or Allen, however appliance makers keep designing increasingly strange screw heads and users keep acquiring increasingly strange screwdrivers.

The comic is about the frustration a user may feel when faced with a screw for which they have no screwdriver. Usually the user will try to fit one of the drivers they have handy into the strange screw, leading to damaging the screw and/or the driver and/or the person wielding the tool.

The types of screws listed are the following:

January 19, 2015

WELL, TECHNICALLY, FOOD IS A "DRUG," SINCE IT'S A SUBSTANCE THAT ALTERS HOW YOUR BODY WORKS, SO YES, I'M—

HEY, LOOK AT THAT WEIRD BUG!

MY LIFE IMPROVED WHEN I REALIZED I COULD JUST IGNORE ANY SENTENCE THAT STARTED WITH "TECHNICALLY."

"Technically that sentence started with 'well', so--" "Ooh, a rock with a fossil in it!"

Explanation

Usually, when the word "technically" is used to start a sentence, the remainder of the sentence tends to follow one of a number of patterns:

Cueball, possibly representing Randall, has decided that any sentence beginning with the word "technically" is highly likely to be completely worthless for him to listen to; so whenever he hears it at the beginning of a sentence, he allows himself to be distracted by anything which happens to be around.

There are many cases where an item is classified in what appears to be an illogical way. Some fairly well known examples are 'Tomatoes are a fruit', 'Strawberries are not berries', 'Peanuts are not nuts' and so on. The reasoning behind these seemingly unusual classifications is typically down to the technical definition of the class, which may differ from the intuitive understanding that the general public have learned. It is not unusual for people to try and appear knowledgeable by demonstrating that they are aware of correct technical classifications.

White Hat starts to pedantically answer the typically incredulous rhetorical question "Are you on drugs?!" by explaining that according to the technical definition, food is classed as a drug. This classification is false due to his incorrect interpretation of the word "drug" and lack of understanding of the role of food in human physiology, and would fall under the fourth example in

the chart above. Indeed, "drug" is defined as "a substance used to treat an illness, relieve a symptom, or modify a chemical process in the body for a specific purpose", followed by a secondary definition of "a psychoactive substance, especially one which is illegal and addictive". Food, on the other hand, is defined as "any substance that can be consumed by living organisms, especially by eating, in order to sustain life". In other words, food is consumed in order to sustain the normal, innate state of the body, while drugs are consumed in order to alter certain states. The Wikipedia article for drug goes so far as to explicitly disqualify food from the definition of "drug."

Regardless of whether or not the classification was valid, Cueball has already allowed himself to be distracted by a passing bug.

The title text starts to pedantically over-apply Cueball's rule to the comic panel, noting that technically White Hat's sentence started with the word 'well' instead of the word 'technically', and thus Cueball is wrong to have ignored it. This would fall under the second or third example in the chart. Halfway through the sentence, this argument is cut off by the discovery of a rock with a fossil in it, correctly applying the rule to a sentence that began with the word "technically".

This comic is similar to 1240: Quantum Mechanics, in that they both suggest ignoring sentences containing a certain word or phrase indicating a pedantic attitude.

#1476: Ceres

January 21, 2015
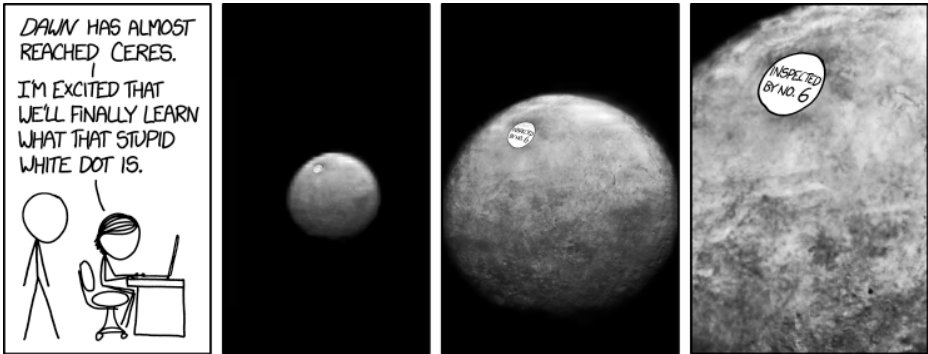
Earth clearly hasn't been inspected, since it's definitely contaminated with salmonella.

Explanation

Ceres is the largest known asteroid and the smallest known dwarf planet. Megan sits at her computer and tells Cueball how exciting it will be when Dawn discovers what the cause of the "stupid white dot" on Ceres is.

Dawn is a probe sent by NASA in 2007 to examine the asteroid belt. Having already visited the protoplanet Vesta in 2012, Dawn is now scheduled to arrive at Ceres on March 6, 2015. Dawn's initial images of Ceres were released two days before this comic, quickly inspiring questions about the white spot. The spot was first noticed in photographs taken by the Hubble Space Telescope.

"Inspected By No. 6" refers to a series of quality assurance stickers used by US clothing manufacturers. Individual inspectors, each assigned a number, randomly sample products for workmanship. Accepted items are marked with that inspector's sticker. The presumed joke is that the white spot is a large sticker indicating that Ceres has passed inspection. This might also reference The Rift's M6 being stationed at Ceres inspecting a crater.

However, this sticker could mean that there is life, probably a Type 3+ civilization. This would mean that there is life in this universe that has control over solar systems, potentially saying that there are Type 3, 4, and

Type 5 civilizations out there since they can control solar systems.

The title text extends the joke to the planet Earth, where salmonella can be found. Salmonella are harmful bacteria sometimes found in food products subject to improper handling or overlong storage. Mixing the realms of astronomical objects and food once more, the title text concludes that the planet Earth hasn't been tested by CERES since salmonella can be found on it.

The Dawn mission is mentioned in 1532: New Horizons.

#1477: Star Wars

January 23, 2015

Panel 1:
WE'RE ALMOST AT THE *BACK TO THE FUTURE* DATE.

WE'RE EVEN CLOSER TO THE *STAR WARS* TIPPING POINT.

THE WHAT?

Panel 2:
ON MAY 13TH, *THE PHANTOM MENACE* WILL HAVE COME OUT CLOSER TO *RETURN OF THE JEDI* THAN TO THE PRESENT

WOW.

RETURN OF THE JEDI   THE PHANTOM MENACE   MAY 13TH

1980   1990   2000   2010

Panel 3:
IT'S WEIRD HOW I'M CONSTANTLY SURPRISED BY THE PASSAGE OF TIME WHEN IT'S LITERALLY THE MOST PREDICTABLE THING IN THE UNIVERSE.

YOU KNOW, "A LONG TIME AGO" SHOULD HAVE "PLUS FOUR MORE DECADES" ADDED IN RERELEASES.

A long, long time (plus 40 years) ago, in a galaxy far, far away (plus a corrective factor involving the Hubble constant) …

Explanation

This is another comic based on pointing out just how much time has passed since the release of a particular film. The same basis is found in 1393: Timeghost and 891: Movie Ages, and a similar theme is used in 647: Scary and 973: MTV Generation. Many people remember going to see major films at the time of release, and in their mind it may seem like "just a few years ago". In reality however, many years have passed, and it comes as a shock to realise just how long ago it was.

In the first panel, Cueball states that we are approaching the Back to the Future date (October 21, 2015), which is the date that protagonist Marty McFly travels to in Back to the Future Part II, released in 1989. Megan adds that we're even closer to May 13, 2015, the "Star Wars tipping point".

The original first set of Star Wars films was released as a trilogy over the span of 6 years, with the third one, Return of the Jedi being released on May 25, 1983. After that, no films were released for 16 years until The Phantom Menace on May 19, 1999, the first in a trilogy of prequels. Thus up until now, the length of time between the two films, 5,839 days, has been greater than the time between the latter film and the present. Megan points out that May 13, 2015 will mark 5,839 days after the release of The Phantom Menace, meaning that for the first time the release date of the two films will be closer together than the latter film is to the present day.

In the final panel, Cueball points out how weird it is that he (along with most other people) are regularly surprised at the passage of time, given how predictable time is by its very nature. Megan's last line is a reference to the famous opening text used in all Star Wars films, "A long time ago in a galaxy far, far away...". It's also a reference to the many changes that have been made to the original Star Wars trilogy (e.g. new CGI effects) as it's been released and rereleased.

The title text repeats the opening text from the films, inserting Megan's suggestion for changing the duration, and extending it to include the Hubble constant for adjusting the distance estimation. The Hubble constant is a value that describes an estimated rate of expansion of the universe. This expansion means that during the 40 years that have passed since the release of the first Star Wars movie, the "galaxy far, far away" has gotten even farther away.

#1478: P-Values

January 26, 2015

If all else fails, use "significant at a p>0.05 level" and hope no one notices.

Explanation

This comic plays on how scientific experiments interpret the significance of their data. P-value is a statistical measure whose meaning can be difficult to explain to non-experts, and is frequently wrongly understood (even in this wiki) as indicating how likely that the results could have happened by accident. Informally, a p-value is the probability under a specified statistical model that a statistical summary of the data (e.g., the sample mean difference between two compared groups) would be equal to or more extreme than its observed value.

By the standard significance level, analyses with a p-value less than .05 are said to be 'statistically significant'. Although the difference between .04 and .06 may seem minor, the practical consequences can be major. For example, scientific journals are much more likely to publish statistically significant results. In medical research, billions of dollars of sales may ride on whether a drug shows statistically significant benefits or not. A result which does not show the proper significance can ruin months or years of work, and might inspire desperate attempts to 'encourage' the desired outcome.

When performing a comparison (for example, seeing whether listening to various types of music can influence test scores), a properly designed experiment includes an experimental group (of people who listen to music while taking tests) and a control group (of people who take tests without listening to music), as well as a null

hypothesis that "music has no effect on test scores". The test scores of each group are gathered, and a series of statistical tests are performed to produce the p-value. In a nutshell, this is the probability that the observed difference (or a greater difference) in scores between the experimental and control group could occur due to random chance, if the experimental stimulus has no effect. For a more drastic example, an experiment could test whether wearing glasses affects the outcome of coin flips - there would likely be some amount of difference between the coin results when wearing glasses and not wearing glasses, and the p-value serves to essentially test whether this difference is small enough to be attributed to random chance, or whether it can be said that wearing glasses actually had a significant difference on the results.

If the p-value is low, then the null hypothesis is said to be rejected, and it can be fairly said that, in this case, music does have a significant effect on test scores. Otherwise if the p-value is too high, the data is said to fail to reject the null hypothesis, meaning that it is not necessarily counter-evidence, but rather more results are needed. The standard and generally accepted p-value for experiments is <0.05, hence why all values below that number in the comic are marked "significant" at the least.

The chart labels a p-value of exactly 0.050 as "Oh crap. Redo calculations" because the p-value is very close to being considered significant, but isn't. The desperate researcher might be able to redo the calculations in order to nudge the result under 0.050. For example, problems can often have a number of slightly different and equally

plausible methods of analysis, so by arbitrarily choosing one it can be easy to tweak the p-value. This could also be achieved if an error is found in the calculations or data set, or by erasing certain unwelcome data points. While correcting errors is usually valid, correcting only the errors that lead to unwelcome results is not. Plausible justifications can also be found for deleting certain data points, though again, only doing this to the unwelcome ones is invalid. All of these effectively introduce sampling bias into the reports.

The value of 0.050 demanding a "redo calculations" may also be a commentary on the precision of harder sciences, as the rest of the chart implicitly accepts any value following the described digit for a given description; if you get exactly 0.050, there's the possibility that you erred in your calculations, and thus the actual result may be either higher or lower.

Values between 0.051 and 0.06 are labelled as being "on the edge of significance". This illustrates the regular use of "creative language" to qualify significance in reports, as a flat "not significant" result may look 'bad'. The validity of such use is of course a contested topic, with debates centering on whether p-values slightly larger than the significance level should be noted as nearly significant or flatly classed as not-significant. The logic of having such an absolute cutoff point for significance may be questioned.

Values between 0.07 and 0.099 continue the trend of using qualifying language, calling the results "suggestive"

or "relevant". This category also illustrates the 'technique' of resorting to adjusting the significance threshold. Appropriate experimental design requires that the significance threshold be set prior to the experiment, not allowing changes afterward in order to "get a better experiment report", as this would again insert bias into the result. A simple change of the threshold (e.g. from 0.05 to 0.1) can change an experiment's result from "not significant" to "significant". Although the statement "significant at the $p<0.10$ level" is technically true, it would be highly frowned upon to use in an actual report.

Values higher than 0.1 are usually considered not significant at all, however the comic suggests taking a part of the sample (a subgroup) and analyzing that subgroup without regard to the rest of the sample. Choosing to analyze a subgroup in advance for scientifically plausible reasons is good practice. For example, a drug to prevent heart attacks is likely to benefit men more than women, since men are more likely to have heart attacks. Choosing to focus on a subgroup after conducting an experiment may also be valid if there is a credible scientific justification - sometimes researchers learn something new from experiments. However, the danger is that it is usually possible to find and pick an arbitrary subgroup that happens to have a better p-value simply due to chance. A researcher reporting results for subgroups that have little scientific basis (the pill only benefits people with black hair, or only people who took it on a Wednesday, etc.) would clearly be "cheating." Even when the subgroup has a

plausible scientific justification, skeptics will rightly be suspicious that the researcher might have considered numerous possible subgroups (men, older people, fat people, sedentary people, diabetes suffers, etc.) and only reported the subgroups for which there are statistically significant results. This is an example of the multiple comparisons problem, which is also the topic of 882: Significant.

If the results cannot be normally considered significant, the title text suggests as a last resort to invert $p<0.050$, making it $p>0.050$. This leaves the statement mathematically true, but may fool casual readers, as the single-character change may go unnoticed or be dismissed as a typographical error ("no one would claim their results aren't significant, they must mean $p<0.050$"). Of course, the statement on its face is useless, as it is equivalent to stating that the results are "not significant".

#1479: Troubleshooting

January 28, 2015

WAIT, WHY CAN'T I CLICK ANYWHERE?

I DON'T... UGH, IT OPENED A DIALOG BOX OFFSCREEN.

WHY IS THAT EVEN *POSSIBLE?*

IT REALLY SHOULDN'T BE. BUT YOU CAN FIX IT BY CHANGING YOUR SCREEN RESOLUTION TO TRIGGER A WINDOW CLEANUP.

SERIOUSLY?

I KNOW, I KNOW...

TO BE HONEST, I CAN'T *WAIT* FOR THE DAY WHEN ALL MY STUPID COMPUTER KNOWLEDGE BECOMES OBSOLETE.

"Oh, you're using their Chrome APP, not their Chrome EXTENSION. They're very similar but one handles window creation differently." is a thing I hope I can stop saying soon.

Explanation

This comic revolves around the complexity of modern software and its sometimes low quality. Many problems that users experience are not obvious or straightforward, and methods for correcting the root cause of the problem requires invoking unrelated actions that happen to cause a desired side-effect. Knowing the non-obvious cause, the desired side effect, and how to trigger the unrelated feature that causes it requires memorization of lots of "stupid computer knowledge" rather than general principles and logical investigation of the software.

One particular example of an illogical fix to a software problem is depicted in the comic. Here, Cueball is trying to help Hairy resolve the problem of a program that is not responding to any mouse clicks. Cueball surmises that this is not due to abnormal behavior of the software (such as freezing), but rather because either the user or the software itself has opened a modal dialog window outside of the main screen area, where it can not be seen. Modal dialog windows block access to the rest of the application, by seizing the sole focus of the user input. They are valid GUI tools and are used when the software needs the user's input before it can proceed further. However, opening such a window and placing it outside of the visible screen area ("off-screen") will make the window both inaccessible and invisible to the user, precluding them from closing it and re-gaining access to the software.

One non-obvious way to repair such a problem is to switch the screen resolution; this in itself does not fix the problem, but the resolution switch also forces the operating system to redraw all windows on the desktop, and some operating systems will also validate the coordinates of all windows and adjust these coordinates so that the windows do not end up in off-screen area. In this scenario, it is used as a side-effect to fix the problem, because operating systems rarely provide other, more obvious ways to bring off-screen windows back to the visible area.

By saying "Why is that even possible?", Hairy is quite correct in pointing out that the best way to address this problem at its root would be for the operating system developers to prevent the creation of windows off-screen, preemptively avoiding a whole class of window management problems before they can occur. For example, such mechanisms could validate coordinates during window creation, thus making sure that the dialog window would always be accessible and visible. Such a mechanism exists on OS X, but not on Windows, which the majority of desktop/laptop computers are running at the time of this comic's release.

In general, one can sort the possible solutions to the problem being discussed in the following order of preference, from best to worst:

- (Best): Have OS programmers implement automatic coordinate adjustment during window creation

- Have OS programmers provide easily accessible and visible control to invoke coordinate adjustment for all windows

- Have OS programmers provide a shortcut to invoke coordinate adjustment for all windows

- (Worst, depicted in comic): Have users rely on side-effect of properly implemented screen resolution change mechanism to fix the problem counter-intuitively.
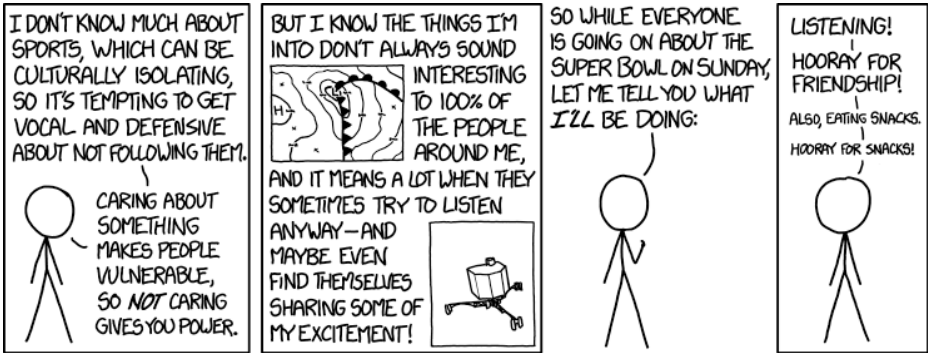
The title text refers to the fact that two different and unrelated software packages can have confusingly similar names, even if the usage and features of those two packages can vary wildly, and knowing the implications of using one instead of the other is a case of "stupid computer knowledge". Knowing the difference between a Chrome app, a cell phone app-style application, delivered from the Chrome web store, designed to be run in the Chrome browser, and a Chrome extension, a browser extension installed into the Chrome browser, delivered from the Chrome web store, designed to modify the behavior of the browser itself, is a subtle distinction that may not be immediately apparent to users who might just have the name of the software they are looking for. Google Hangouts is an example of a product that exists as both a Chrome app and a Chrome extension, whose windows are more similar to each other than to normal Chrome browser windows; and confusingly, it's possible to be signed into one account with the app and another with the extension, especially when your employer or school uses Apps for

Business/Education.

In many cases, Randall (or Cueball, his avatar) loves to help people using his specific knowledge (see 208: Regular Expressions). But when the trick is "stupid", he would prefer the programmers to fix the problem definitively so he never has to rely on this trick anymore.

#1480: Super Bowl

January 30, 2015

Panel 1: I DON'T KNOW MUCH ABOUT SPORTS, WHICH CAN BE CULTURALLY ISOLATING, SO IT'S TEMPTING TO GET VOCAL AND DEFENSIVE ABOUT NOT FOLLOWING THEM.

CARING ABOUT SOMETHING MAKES PEOPLE VULNERABLE, SO *NOT* CARING GIVES YOU POWER.

Panel 2: BUT I KNOW THE THINGS I'M INTO DON'T ALWAYS SOUND INTERESTING TO 100% OF THE PEOPLE AROUND ME, AND IT MEANS A LOT WHEN THEY SOMETIMES TRY TO LISTEN ANYWAY—AND MAYBE EVEN FIND THEMSELVES SHARING SOME OF MY EXCITEMENT!

Panel 3: SO WHILE EVERYONE IS GOING ON ABOUT THE SUPER BOWL ON SUNDAY, LET ME TELL YOU WHAT I'LL BE DOING:

Panel 4: LISTENING! HOORAY FOR FRIENDSHIP! ALSO, EATING SNACKS. HOORAY FOR SNACKS!

My hobby: Pretending to miss the sarcasm when people show off their lack of interest in football by talking about 'sportsball' and acting excited to find someone else who's interested, then acting confused when they try to clarify.

Explanation

In this comic, Cueball, representing Randall, explains that even though he does not care about sports and is tempted to be scornful about others' obsession with them, he understands that people feel vulnerable about stuff they care about. And he will for sure be fed up with all the talk about the Super Bowl discussions and arguments over the coming weeks. (The comic was released on a Friday two days before Super Bowl XLIX, the championship game of the 2014 NFL season held on 2015-02-01). However, since other people tolerate his interest in odd things like meteorology and the Philae lander (see 1324: Weather and 1446: Landing), he recognizes that he should show the same consideration to them. This is an invocation of the Golden Rule, "Do unto others as you would have them do unto you".

In the last frame, he tells us that instead of celebrating the sports event on Sunday, he will be celebrating friendship (through listening to his friends) and, as a side note, snacking (as they are very frequently brought to Super Bowl-watching events). This suggests that the value of friendship trumps the discomfort of watching human activities that seem uninteresting to him – and of course, the free snacks also help ameliorate his discomfort.

In a previous comic, Cueball spent his time differently during the Super Bowl - see 60: Super Bowl. (This was the second time that two xkcd comics have shared the exact same name). The year after he continued the trend

with a Super Bowl related comic to "celebrate" the event: 1640: Super Bowl Context. Between the 2006 comic and this one there were no other Super Bowl related comics coming out in relation to the Super Bowl. See also 1107: Sports Cheat Sheet and two other comics where he jokes with sport in general: 904: Sports and 1507: Metaball. He again explicitly mentions lack of knowledge in 1859: Sports Knowledge.

The title text continues the My Hobby trope characteristic of some xkcd comics: here, Randall references people who scornfully refer to popular sports such as football, basketball, and/or baseball as "sportsball" and creates discomfort for them by pretending to be interested in this imaginary sport. This makes it appear as though they are in fact interested in sports when they are not, exposing their snobbishness. (It is worth noting that there is a Wii U game by that name.)

#1481: API

February 02, 2015

IF YOU DO THINGS RIGHT, IT CAN TAKE PEOPLE A WHILE TO REALIZE THAT YOUR "API DOCUMENTATION" IS JUST INSTRUCTIONS FOR HOW TO LOOK AT YOUR WEBSITE.

ACCESS LIMITS: Clients may maintain connections to the server for no more than 86,400 seconds per day. If you need additional time, you may contact IERS to file a request for up to one additional second.

Explanation

This comic presents a web site designed for human readers as if it had an API (application programming interface) designed for machine-to-machine web service. An API is a set of instructions about a computer program, intended to be used by developers of other computer programs, so the two programs can interoperate more easily. The documentation explains how to send commands to the program, and how the output will be returned.

Many web APIs are designed to return data in XML format. But in this case, the XML is XHTML, a version of the language that is used by most web pages. The "requested data" is the actual content (e.g., a blog post), and "documentation" refers (in an obscure way) to the parts of a web page that control how it looks on the screen (e.g. CSS and perhaps JavaScript layout code). The "documentation" may also be DTD which tells the XML parser info about this particular XML format, i.e. XHTML.

In order for a program to process a generic web site designed for human viewing, the program needs to use web scraping techniques, which often break when the web site design changes in subtle ways that a human might never notice. Therefore, developers prefer to have proper APIs with well-defined machine-readable formats, stable interfaces and documentation that actually describes the semantics of the data.

For example, Google has an official API for version 3 of their YouTube web service. But developers who don't want to hassle with the required API key or the costs associated with its use sometimes just scrape the regular YouTube web site. So, someone could publish this comic with a YouTube URL as a convoluted hint to developers that there is an alternative to the official API.

The API keys section is a step-by-step description of how a web page is protected with HTTP Secure (HTTPS). The Transport Layer Security (TLS) protocol uses an elliptic curve Diffie–Hellman (ECDH) key signed using Rivest-Shamir-Adleman (RSA) encryption, which is stored in an X.509 certificate. Normally, the browser or operating system does this behind the scenes, so most web developers and users do not need to know these details.

The access limits mentioned in the title text says that the API can be used for 86,400 seconds each day. At first this may appear to be a strange arbitrary number; however, it is in fact the total number of seconds in 24 hours, essentially meaning there is no limit on most days. The International Earth Rotation and Reference Systems Service (IERS) is the organization that decides when to add leap seconds, which account for slight anomalies in the Earth's rotation as compared to the mean solar day. These leap seconds will mean that the website is available for one extra second occasionally, although IERS decisions are based on actual Earth rotation rates, and they of course wouldn't respond to requests for leap seconds in order to lengthen the number of seconds that

a web site would be available for in a given calendar day. The API does not discuss the issue that some days have 23 or 25 hours due to daylight saving time in the U.S. and summer time in Europe and some other places. This suggests that the web service tracks time via UTC.

#1482: #NowPlaying

February 04, 2015

MY NEW SOCIAL MUSIC SERVICE NOTIFIES YOUR
FRIENDS ABOUT WHAT NOTES YOU'RE LISTENING TO.

If you click on the post, it takes you to search results
for the note on various online music stores.

Explanation

There are a variety of applications that post a user's music-listening habits on their preferred social network. In this comic, Randall takes that notion to its extreme, envisioning a program that does this note-by-note, rather than just song-by-song (This program is hard to implement in reality, as most of the music files shared online are wave tables .mp3, and it may be difficult to extract notes from them). As songs play several dozen notes a minute (and some songs, many more), this would lead to the flooding of friends' notification streams. In the example, the software is sharing the notes that Brian is listening to; and his friends Mike and Caitlin are getting annoyed with the number of posts they are receiving.

There are typically many hundreds of notes in any song. Any song with more than a single line of music contains multiple different notes whose names according to the English convention are communicated here. All but the slowest songs will require reporting dozens to hundreds of notes every minute (a single glissando may cover a dozen or more notes in less than a second), meaning that anyone who can see your stream of posts will be literally inundated by posts from the service. Even if you could keep up with the speed of the posted notes that someone is listening to, the similarity in phrases in many songs (especially pop songs, e.g. Pachelbel's Rant) means that many different songs may include the same sequence of notes, though possibly in different octaves or at different

speeds. The so-called "Black MIDI" music files would contain thousands, or even millions of notes (a notable example being "Pi" by TSMB2 on YouTube with 3 million notes in total: an average of about 16000 notes per second), and this may annoy Mike and Caitlin even more - probably by crashing their phone system with too many notifications.[citation needed]

The comic's title alludes to the fact that you can "play a song" but can also "play a note." It may also allude to the visual similarities between the hash/pound/number sign (#) and the sharp sign (). C sharp, above Mike's comment, is the only note not given by a single letter (after the correction - see Trivia).
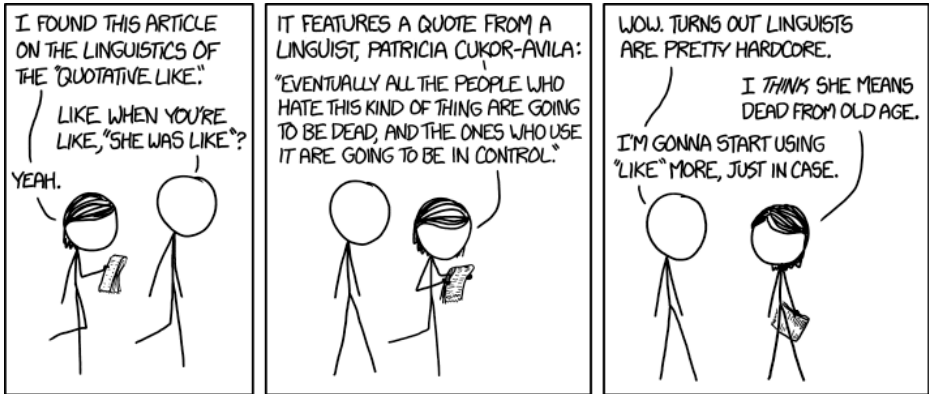
The title text continues the joke of this new musical service: If you click on the post, it takes you to search results for the note on various online music store. Since many songs in similar keys contain at least some of the notes posted, you would be given a list of a large part of the music you can buy in any on-line music stores. Of course this is at least as useless as being told which note someone is listening to.

The notes appear to be the beginning of I'll Be There For You by The Rembrandts, the title music of the TV series "Friends". This could be an internal reference to the idea that it "notifies" (converts into musical notes) your "friends" of the notes (a play on words).

Or we've been nerd sniped.

#1483: Quotative Like

February 06, 2015

I FOUND THIS ARTICLE ON THE LINGUISTICS OF THE "QUOTATIVE LIKE."

LIKE WHEN YOU'RE LIKE, "SHE WAS LIKE"?

YEAH.

IT FEATURES A QUOTE FROM A LINGUIST, PATRICIA CUKOR-AVILA:

"EVENTUALLY ALL THE PEOPLE WHO HATE THIS KIND OF THING ARE GOING TO BE DEAD, AND THE ONES WHO USE IT ARE GOING TO BE IN CONTROL."

WOW. TURNS OUT LINGUISTS ARE PRETTY HARDCORE.

I *THINK* SHE MEANS DEAD FROM OLD AGE.

I'M GONNA START USING "LIKE" MORE, JUST IN CASE.

God was like, "Let there be light," and there was light.

Explanation

In this comic, Megan mentions an article on the use of the word "like" as a quotative. Cueball makes a joke on this by managing to use the word "like" three times in a seven word sentence.

The "quotative like" is regularly given as an example of the decline of the English language. It is used to introduce a quotation or impersonation, although what follows may not be a verbatim quote, but rather conveys the general meaning of the original phrase. Although it is modern in terms of the English language, examples of its use can be found all the way back in 1928. The song "Cobwebs" by the American singer-songwriter Loudon Wainwright III blames Jack Kerouac and The Many Loves of Dobie Gillis character Maynard G. Krebs for starting the vogue of using the word "like" as a quotative. In the early 1980s, the stereotypical Valley Girl made substantial use of the quotative like, which may be the main origin of its contemporary use.

In the second panel Megan mentions that, in a newspaper article, the linguist Patricia Cukor-Avila is like: "Eventually all the people who hate this kind of thing are going to be dead, and the ones who use it are going to be in control."

The author is presumably making the point that language is inherently fluid, and the meanings of words exist only by common understanding, which means that,

as more and more people grow up with the new usage, it will become increasingly accepted. Most resistance will come from the older generation, which means it will diminish over time. While it has long been popular to criticize modern developments that are seen as steps backward (see 1227: The Pace of Modern Life), such criticisms are usually in vain, as they are typically made by the older generation against the younger generation, and the latter is always guaranteed to outlive the former[citation needed].

The quote, however, doesn't actually say why the older generation will die out, leading Cueball to speculate that Dr. Cukor-Avila is plotting (or warning of) some sort of genocide against people who dislike the use of the quotative like. Megan points out a much more likely interpretation (although this is not mentioned directly in the article), that those people will die of old age, but Cueball persists, saying he'll err on the side of caution and make sure to use the quotative like more often, thereby hoping to be spared from the genocide.

The title text applies quotative like to the Book of Genesis (specifically, Genesis 1:3: "God said, 'Let there be light,' and there was light"), the first book of the Hebrew Bible (the Tanakh) and the Christian Old Testament. When researching the history of language etymologists take great effort to find the earliest usage of a word or phrase, which may be used to show a historical precedence.

#1484: Apollo Speeches

February 09, 2015

IN 1969, NIXON STAFFER WILLIAM SAFIRE WROTE A SPEECH FOR THE PRESIDENT TO DELIVER IF THE APOLLO 11 RETURN LAUNCH FAILED, STRANDING THE DOOMED ASTRONAUTS ON THE MOON. UNCOVERED IN 1999, IT IS OFTEN CALLED THE GREATEST SPEECH NEVER GIVEN.

TODAY, THE *FULL* SET OF SAFIRE'S CONTINGENCY SPEECHES HAS BEEN FOUND.

IN EVENT ASTRONAUTS STRANDED ON MOON

FATE HAS ORDAINED THAT THE MEN WHO WENT TO THE MOON TO EXPLORE IN PEACE WILL STAY ON THE MOON TO REST IN PEACE.

IN ANCIENT DAYS, MEN LOOKED AT STARS AND SAW THEIR HEROES IN THE CONSTELLATIONS. IN MODERN TIMES, WE DO MUCH THE SAME, BUT OUR HEROES ARE EPIC MEN OF FLESH AND BLOOD.

OTHERS WILL FOLLOW, AND SURELY FIND THEIR WAY HOME. MAN'S SEARCH WILL NOT BE DENIED. BUT THESE MEN WERE THE FIRST, AND THEY WILL REMAIN THE FOREMOST IN OUR HEARTS. FOR EVERY HUMAN BEING WHO LOOKS UP AT THE MOON IN THE NIGHTS TO COME WILL KNOW THAT THERE IS SOME CORNER OF ANOTHER WORLD THAT IS FOREVER

IN EVENT SPACECRAFT GOES MISSING

NEIL ARMSTRONG, EDWIN ALDRIN, AND MICHAEL COLLINS WENT TO THE MOON AS AMBASSADORS OF PEACE FOR ALL MANKIND, AND ALL MANKIND PRAYS THAT THEY MAY YET RETURN SAFELY HOME.

WE ARE SEPARATED FROM THE MOON BY A VAST GULF OF SPACE, AGAINST WHICH THEIR TINY VESSEL APPEARED AS BUT A DRIFTING SPECK. FOR A FEW BRIEF SECONDS, WE TOOK OUR EYE OFF THEM, AND DESPITE DAYS OF DESPERATE SEARCHING, NEVER AGAIN WAS THEIR VESSEL SIGHTED FROM EARTH.

WHILE THESE MEN ARE LOST, THEY ARE NOT FORGOTTEN. AND THEIR SACRIFICE WILL NOT

IN EVENT ASTRONAUTS ABSCOND WITH SPACECRAFT

WE DO NOT KNOW WHAT LED ARMSTRONG, ALDRIN, AND COLLINS TO BETRAY THE TRUST WE PLACED IN THEM, ABANDON THEIR MISSION, AND STEER THEIR VESSEL TOWARD MARS. NOR DO WE KNOW WHAT COMPELLED THEM TO TRANSMIT SUCH HURTFUL MESSAGES BACK TO EARTH, HEAPING CONTEMPT ON THEIR ONETIME HOME.

BUT WHATEVER THE CAUSE OF THEIR DERELICTION, I CALL UPON THE UNITED STATES TO COMMIT ITSELF, BEFORE THIS YEAR IS OUT, TO LAUNCHING A MISSION TO CHASE DOWN APOLLO 11 AND RETURN ITS CREW TO EARTH TO FACE JUSTICE. WE MUST NOT REST UNTIL

IN EVENT SPACECRAFT RETURNS WITH EXTRA ASTRONAUTS

WHILE THERE IS MUCH WE DO NOT UNDERSTAND, TONIGHT ALL OF EARTH IS UNITED IN CELEBRATING THE SAFE RETURN OF OUR BRAVE EXPLORERS.

WE OF COURSE HAVE MANY QUESTIONS, AND IN THE DAYS AND WEEKS TO COME WE WILL DEMAND ANSWERS. HOW MANY SOULS WERE TRULY ABOARD APOLLO 11 WHEN IT LAUNCHED? WHO ARE THE SIX MEN NOW IN QUARANTINE ABOARD THE U.S.S. HORNET? WHAT HAPPENED

IN EVENT SPACECRAFT HITS U.S.S. HORNET, CRUSHING NIXON

PRESIDENT AGNEW: TONIGHT, WE HAVE EXPERIENCED A GREAT NATIONAL TRIUMPH AND A GREAT NATIONAL LOSS. WE TAKE JOY IN THE SAFE RETURN FROM THE MOON OF NEIL ARMSTRONG, EDWIN ALDRIN, AND MICHAEL COLLINS, BUT THAT JOY IS TEMPERED WITH SORROW AS WE MOURN OUR PRESIDENT'S TRAGIC DEATH BENEATH THEIR WAYWARD CAPSULE.

RICHARD NIXON WHOLEHEARTEDLY SUPPORTED OUR COURAGEOUS ASTRONAUTS AS THEY CARRIED THE HOPES AND PRAYERS OF EARTH TO THE HEAVENS, AND IN THE MOMENT OF THEIR HOMECOMING, HE HIMSELF HAS DEPARTED ON THAT ULTIMATE VOYAGE. AS WE GRIEVE, WE MUST REDEDICATE OURSELVES TO THE CAUSE FOR WHICH OUR PRESIDENT

IN EVENT SPACECRAFT ACCIDENTALLY SOLD FOR SCRAP AND CRUSHED WITH ASTRONAUTS INSIDE

MY FELLOW AMERICANS, I AM AS SHOCKED AND APPALLED AS YOU AT THIS STUNNING AND

While our commitment to recycling initiatives has been unwavering, this is not a cost any of us should be expected to pay.

Explanation

As explained in the comic, Nixon staffer William Safire wrote two speeches for the United States President to deliver, depending on whether or not the Apollo 11 return launch was successful. When the outcome of an event (moon landing, military actions, etc.) can't be predicted with sufficient certainty, it is a common practice for "contingency speeches" to be prepared.

The rest of the comic runs with this theme, making the false claim that Safire had written several other such contingency speeches for increasingly unlikely possibilities. First listed are a couple pages from the real contingency speech to be delivered in the event that the astronauts were left stranded on the Moon. The speeches after that deal with the following increasingly improbable contingencies:

This was relatively unlikely, as communication with the spacecraft was maintained throughout the entire mission, except for when it transited behind the Moon. There were times, even on the nearside, when communications were 'spotty', and they had to change which antennas were used, but the problems were more with telemetry readings than the loss of scheduled voice contact.

While the crew could have redirected the ship while sending insulting messages to Earth, three mature adult men who would not have been entrusted with the mission had they shown signs of immaturity or mental

instability. (Indeed, Gordon Cooper was not allowed to fly on Apollo 13 because of his lax attitude towards training, which would have required lesser degree of immaturity than necessary to take the spacecraft off-course and send hurtful messages back. It is even more unlikely that multiple astronauts would have had mental breakdowns at about the same time—in a short enough time interval to prevent the sane two astronauts from radioing back to inform Johnson Space Center of what was going on and request sending a psychologist to CAPCOM. (The cramped environment and relative environment could have made this more likely than the probability of the majority of a group of three on Earth suffering mental breakdowns in the timeframe of a few days, but the crew had radio contact with Earth, and they had each other for company, which was more than the astronauts of Mercury had, and they didn't suffer mental breakdowns.)) Furthermore, the spacecraft lacked the power to fly to Mars within any reasonable period of time by several orders of magnitude or the supplies for the astronauts to survive such an extended trip. At the time of production for this strip in 2015, several governments and private companies have designs on Martian colonization.

Also, the quote "...commit itself, before this year is out..." is similar to John F. Kennedy's quote of "...commit itself to achieving the goal, before this decade is out..." that kicked off the Moon race; this was likely intentional.

The appearance of three (possibly six?) additional astronauts ventures into the realm of possibility normally

reserved for science fiction such as "Twilight Zone" episodes.

The USS Hornet was the ship that recovered the Apollo 11 astronauts after they completed their return mission by landing their command module in the Pacific Ocean; President Nixon himself was on board to greet them upon their return. Apollo 11 famously landed in the Pacific Ocean, and the single ship tasked with its recovery would be a very small target to hit for the technology even if that had been the intent, which it was of course not. Spiro Agnew was, in 1969, Vice President of the United States, and thus next in line for the presidency. This joke plays off the extreme improbability of the ship, and indeed President, being hit and triggering a succession, causing "President Agnew" to address the world.

This is not as implausible as it sounds. The re-entry guidance had become good enough by Apollo 11 that the destination point of the capsule was moved several hundred yards from the carrier's position for exactly this reason. Such a collision had been the subject of jokes at NASA, until one day an engineer came to Gene Kranz and said, "The more I think about it, the less I think it is a joke."

Apollo 11 observed a strict quarantine procedure after landing. This possibility requires extraordinary incompetence and unholy zeal for recycling programs. The command module was historically recovered, examined, and is now on permanent display in the

National Air and Space Museum. Primary sources indicate that the astronauts were allowed to leave the craft before it was put on display[citation needed].

The title text builds upon this last contingency speech, delving into the pathos of the horror of the spacecraft's recycling and its passengers' resulting deaths despite the U.S.'s commitment to recycling initiatives.

#1485: Friendship

February 11, 2015

FRIENDSHIP

FROM WIKIPEDIA, THE FREE ENCYCLOPEDIA

A FRIENDSHIP IS A CLOSE, NON-ROMANTIC RELATIONSHIP BETWEEN TWO (OR MORE) MEN, A FORM OF AFFECTIONAL OR HOMOSOCIAL INTIMACY.[1]

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ETYMOLOGY

FRIENDSHIP IS A PORTMANTEAU OF THE WORDS *FRIEND* AND *SHIP*. EDITOR DAVE CARNIE COINED THE TERM IN THE SKATEBOARD MAGAZINE *BIG BROTHER* IN THE 1990s TO REFER TO THE SORT OF RELATIONSHIPS THAT DEVELOP BETWEEN SKATERS WHO SPEND

PORTRAYAL OF FRIENDSHIP

CELEBRITY AND FICTIONAL FRIENDSHIPS

A NUMBER OF CELEBRITIES HAVE ENGAGED IN FRIENDSHIPS WITH FELLOW CELEBRITIES. EXAMPLES INCLUDE BEN AFFLECK AND MATT DAMON, DESCRIBED AS "PERHAPS *THE* PIONEERING FRIENDSHIP IN SHOWBIZ HISTORY"[9] WHICH LED TO A HIT OFF-BROADWAY PLAY

FRIENDSHIP ON TELEVISION HAS ALSO BECOME MORE COMMONPLACE, WITH SOME CRITICS TRACING ITS ORIGINS BACK TO SUCH SHOWS AS *THE ODD COUPLE*.[14] IN OCTOBER 2008, *TV GUIDE* PLACED GREGORY HOUSE (HUGH LAURIE) AND JAMES

THE JAPANESE AND KOREAN MUSIC INDUSTRY ACTIVELY ENCOURAGES FRIENDSHIP AMONG MALE CELEBRITIES (PARTICULARLY MEMBERS OF BOY BANDS) AS PART OF THE FAN SERVICE TO PLEASE THE AUDIENCE.[19][20]

IN FICTION, WHAT HAD ONCE BEEN CALLED BUDDY FILMS HAVE TO A DEGREE BEEN REBRANDED AS FRIENDSHIP FILMS, ALTHOUGH

HISTORICAL AND POLITICAL FRIENDSHIPS

POLITICALLY, THE RELATIONSHIP BETWEEN BILL CLINTON AND AL GORE HAS BEEN CALLED A PRECURSOR TO THE FRIENDSHIP.[6] THE RELATIONSHIP BETWEEN GEORGE W. BUSH AND FORMER PRESS

HOW TO IMPROVE THE "BROMANCE" WIKIPEDIA ARTICLE

The only other Wikipedia vandalism that I would feel zero remorse about is editing the article on active US militia groups to replace "militia" with "fanclub".

Explanation

A "Bromance" is a modern slang term for a strong non-romantic relationship between two male humans. It is a portmanteau of the words brother, meaning a close male friend (aka "bro"), and romance.

Although current in popular media, some commentators have criticized the implicit homophobia in the term, suggesting that it denotes cultural discomfort at relationships of emotional closeness between men.

In this comic, Randall is implying the Wikipedia page for the word "bromance" should more accurately represent what most bromances actually are: friendships. This could be a joke to reference the fact that some males prefer to not call friendships as such, for fear of looking unmasculine, or being confused as a gay couple. The comic makes light of the fact that the word bromance and friendship are interchangeable, and should be treated as such.

The comic later contains parts of the edited article, mocking the use of "bromance" in popular culture, implying that "friendships" can be used just as easily to describe platonic male relationships.
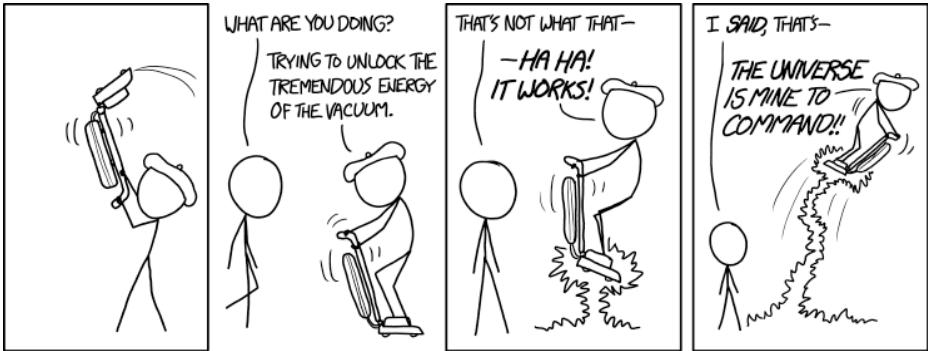
Despite supposedly vandalizing the "bromance" article, the article is titled "friendship", giving a similar result to word-replacement browser extensions, as in 1031: s/keyboard/leopard/.

The title text implies Randall does not agree with Wikipedia vandalism, except in the case of bromance/friendship, and also militia/fanclub, possibly to make light of the harsh sounding word in a negative light. This is probably because many of his comics include fake wikipedia entries, and many people, inspired by the comic, actually make the edit happen.

A later comic called 1746: Making Friends, was also not so much about friendship, but rather about vultures...

#1486: Vacuum

February 13, 2015

What are you doing?

Trying to unlock the tremendous energy of the vacuum.

That's not what that—

—Ha ha! It works!

I *said*, that's—

The universe is mine to command!!

Do you think you could actually clean the living room at some point, though?

Explanation

According to quantum mechanics there is tremendous energy density in space-time itself: this is known as: vacuum energy, zero point energy, vacuum foam, etc. So far we don't know any way to tap into this energy.

In the cartoon, Beret Guy appears to be making a silly mistake, confusing the "vacuum" referred to in calculations of the theoretical energy density of space time with a vacuum cleaner, which is also commonly referred to as just a "vacuum".

Cueball tries to correct him, but it turns out that Beret Guy really is able to tap into this fundamental source of energy. Having such strange and impossible powers is second nature to Beret Guy, as can be seen in many of his appearances – for instance in 1388: Subduction License.

But even though Beret Guy now claims the Universe is his to command (a sentence used by Jafar from Aladdin, but a similar intent is also stated by the crazy villain in many movies), Cueball is not fazed by this and simply asks, in the title text, if Beret Guy would use the vacuum for its intended purpose and clean the living room. This seems to imply Beret Guy has previously, perhaps repeatedly, taken an action that would normally imply he was going to clean the living room (such as taking a broom or some other cleaning implement that is not the vacuum) and done something unexpected with it instead (such as flying off on it).

On an additional note, many scientific breakthroughs in history have been made because the person making them did not realize they were supposedly impossible, such as spin-stabilized magnetic levitation. This comic could be seen as a nod to that.

It seems that Cueball borrows one of Beret Guy's vacuum cleaners later in 1826: Birdwatching. A normal vacuum cleaner would not be able to do what Cueball's presumably does to birds in that comic!

#1487: Tornado

February 16, 2015

THE TORNADO TOUCHED DOWN DIRECTLY OVER A MERRY-GO-ROUND, IN WHAT VICTIMS ARE CALLING A "FUN" AND "AWESOME" DISASTER.

Nearby, there were also no injuries when a multi-vortex tornado hit one of those spinning teacup rides.

Explanation

A merry-go-round (or carousel) is an amusement ride consisting of a (usually) slowly rotating circular platform with seats for riders. These seats are traditionally wooden horses. Merry-go-rounds usually rotate slowly, as it is a children's ride.[citation needed] The implication is that a tornado have made a merry-go-round spin much faster, creating the "fun" and "awesome" experience described by the news commentator. In reality such an event would most likely destroy the merry-go-round or at least damage it in a way that would keep it from spinning, such as by breaking an axle or bearing. Barring damage to the merry-go-round itself, if the tornado caused it to spin much faster than normal, anyone riding it at the time would likely be thrown off and injured due to the increased centrifugal force.

The title text refers to the spinning teacup ride which consists of several circular units ("teacups") that seat several people each. They rotate around their center axis, while simultaneously orbiting the center of the entire ride, exposing people to acceleration in rapidly shifting, seemingly random directions. The second tornado system, as reported in the title text, had multiple vortices, similarly rotating around a common center, that attached themselves to each of the "teacups", also spinning them faster than normal operation of the ride would have. This is, of course, even less likely (to happen, and to result in no injuries if it did) than the single-vortex tornado on a merry-go-round.

Tornadoes are a recurring subject on xkcd. This setup is a variety of the news anchor category, but since Cueball is not in a studio it cannot be included in that category.

#1488: Flowcharts

February 18, 2015
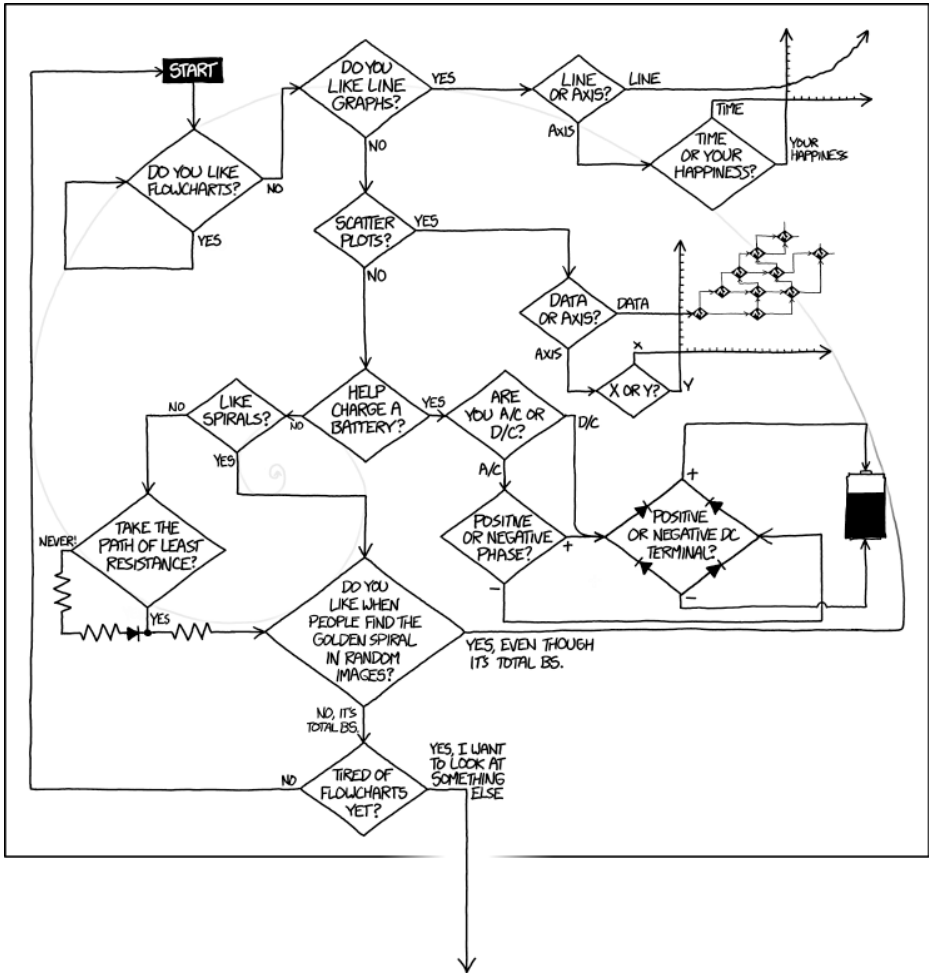
Whoa, and if you overlay a Fibonacci spiral on a golden spiral it matches up almost perfectly!

Explanation

Note: A flawed version of this comic was posted at first and then quickly a correct version was uploaded. But this gave rise to several misunderstandings and confusion. See the Trivia section below.

This comic is a flowchart style, like many. Interestingly, the first option, Do you like flowcharts? loops back to itself if you say Yes. As the yes lines of other options point to the type of graph they describe (for example, the yes line of Do you like line graphs? points to a line graph), this may be interpreted as a recursive reference to the flowchart itself, although it points to the option itself rather than the START node. Also, this may cause the reader who actually likes flow charts to go into an endless loop of choosing Yes, until they are so annoyed by flowcharts that they do not like them anymore and can progress by saying No.

After asking about flowcharts, the reader is asked whether they like line graphs. If they follow the yes line, it becomes a line graph where "Time" is the x-axis and "Your Happiness" is the y-axis, and shows that your happiness increases with time. If you don't like line graphs, they are asked the same question about scatter plots where again the lines turn into the points and the axis of such a plot except for now the dots connect and you are given the choice to go up or to the side, shown by the arrows.

Taking yet another line, the reader is asked "Charge a battery?" If they follow the line marked yes they are asked whether they are A/C or D/C current and are led to a portion of the flowchart which resembles a circuit diagram of a rectifier bridge with a battery connected to it.

If the reader follows the "no" line, they are asked if they like spirals. If they choose "no" they are asked whether they would take the path of least resistance. This part of the flowchart resembles a circuit diagram, and the word "resistance" is a pun because resistance can have several meanings. In electricity it is an electrical quantity that measures how the device or material impedes the electric current flow through it. Going left is the "Never" option, which goes through extra resistors and a diode, therefore making the "Yes" option the "path of least resistance". However, when asked if you choose the path of least resistance and answers never it could also mean that you do not try to avoid a little trouble.

Whether they choose "Yes" or "No", they arrive at "Do you like when people find the golden spiral in random images?" If they choose "yes" the line fades into a drawing of a golden spiral, and we see that the flowchart is structured around it. If they choose "no" they are asked if they are tired of flowcharts. If not, they are taken to the beginning to start over again. If they are tired, the line points to the "random" button on the xkcd website.

The title text and the faint image of a golden spiral parody the fact that the golden spiral is superimposed on
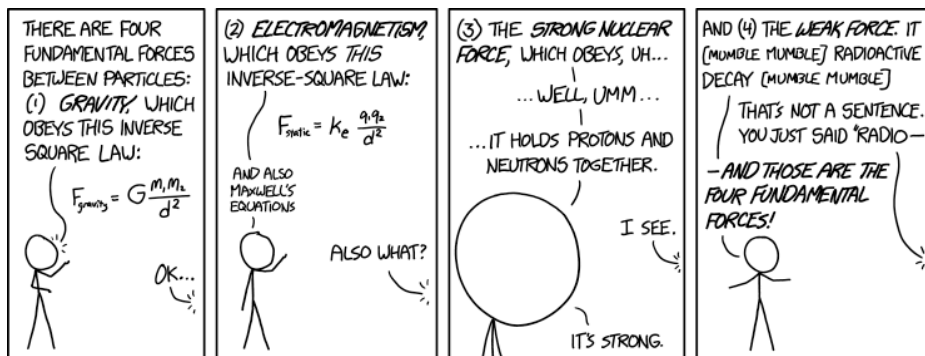
nearly everything. The golden spiral is a spiral that has the growth rate of the golden ratio, a number that has inspired both artists and mathematicians alike. However, people try to find the golden ratio in seemingly random objects, and they fall to confirmation bias when drawing a golden spiral on top that seemingly fits. The comic links to , where one can see exactly that- golden spirals Randall "found" in random photographs. This may be a spoof of the viral video Illuminati Confirmed. The limit of the ratio of two consecutive terms of the Fibonacci sequence is equal to the golden ratio, so a Fibonacci spiral match up almost perfectly for a good reason, unlike the coincidental matchings of the pictures in the mobile site link.

This comic bears reminiscence of 730: Circuit Diagram, although it is not exactly the same idea. Putting a golden spiral over other things was again used in 2322: ISO Paper Size Golden Spiral, like the spiral page on xkcd which this comic is a link to.

List of Items in Flowchart[edit]

#1489: Fundamental Forces

February 20, 2015

Panel 1: THERE ARE FOUR FUNDAMENTAL FORCES BETWEEN PARTICLES: (1) *GRAVITY*, WHICH OBEYS THIS INVERSE SQUARE LAW:

$$F_{gravity} = G \frac{m_1 m_2}{d^2}$$

OK...

Panel 2: (2) *ELECTROMAGNETISM*, WHICH OBEYS *THIS* INVERSE-SQUARE LAW:

$$F_{static} = k_e \frac{q_1 q_2}{d^2}$$

AND ALSO MAXWELL'S EQUATIONS

ALSO WHAT?

Panel 3: (3) THE *STRONG NUCLEAR FORCE*, WHICH OBEYS, UH...

...WELL, UMM...

...IT HOLDS PROTONS AND NEUTRONS TOGETHER.

I SEE.

IT'S STRONG.

Panel 4: AND (4) THE *WEAK FORCE*. IT [MUMBLE MUMBLE] RADIOACTIVE DECAY [MUMBLE MUMBLE]

THAT'S NOT A SENTENCE. YOU JUST SAID "RADIO—

—AND THOSE ARE THE FOUR FUNDAMENTAL FORCES!

"Of these four forces, there's one we don't really understand." "Is it the weak force or the strong--" "It's gravity."

Explanation

Cueball is acting here as someone teaching physics at a basic level, perhaps a high school science teacher. He seems to understand the general idea of the four fundamental forces, but his understanding gets progressively more sketchy about the details. The off-panel audience, probably a student or class, is interested, but quickly begins to realize Cueball's lack of understanding. Instead of acknowledging the problem directly, Cueball simply blusters onwards.

The comic also outlines how progressively difficult it gets to describe the forces. Gravity was first mathematically characterized in 1686 as Newton's law of universal gravitation, which was considered an essentially complete account until the introduction of general relativity in 1915. The electromagnetic force does indeed give rise to Coulomb's law of electrostatic interaction (another inverse-square law, proposed in 1785), but a much more comprehensive description, covering full classical electrodynamics, was only given in Maxwell's equations around 1861. The strong and weak forces cannot easily be summarized as comparably simple mathematical equations. It's possible that Cueball does understand the strong and weak interactions, but is completely at a loss when he tries to summarize them.

The strong force doesn't act directly between protons and neutrons but between the quarks that form them. Unlike gravity and electromagnetism, the strong force

gets stronger with increasing distance: It is loosely similar to the restoring force of an extended spring. However, all stable heavy particles are neutral to the strong force, due to being made up of three "colors" (or a color and the appropriate "anticolor") of quarks. Between protons and neutrons there is a residual strong force, analogous in some ways to the van der Waals force between molecules. This residual strong force is carried by pions and does decrease rapidly and exponentially with distance due to the pions having mass.

The weak force is much weaker than electromagnetism at typical distances within an atomic nucleus (but is still stronger than gravity), and has a short range, so has very little effect as a force. What it has instead is the property of changing one particle into another. It can cause a down quark to become an up quark, and in the process release a high-energy electron and electron anti-neutrino. This is known as beta decay, a form of radioactivity. Over even shorter distances, and much higher temperatures, the weak interaction and electromagnetism are essentially the same, thus being merged to form the electroweak force. The electroweak force was also mentioned in a later comic, 1956: Unification.

The title text touches upon a strange paradox regarding gravity: in isolation it is the simplest and easiest to understand of the four forces, with well-understood equations that can be taught to the layman with clear-cut examples (as it is the one force everyone experiences on a regular basis). However when taking other forces into account gravity turns out to be the hardest to reconcile

with a coherent (quantum) understanding of all four forces together.

#1490: Atoms

February 23, 2015
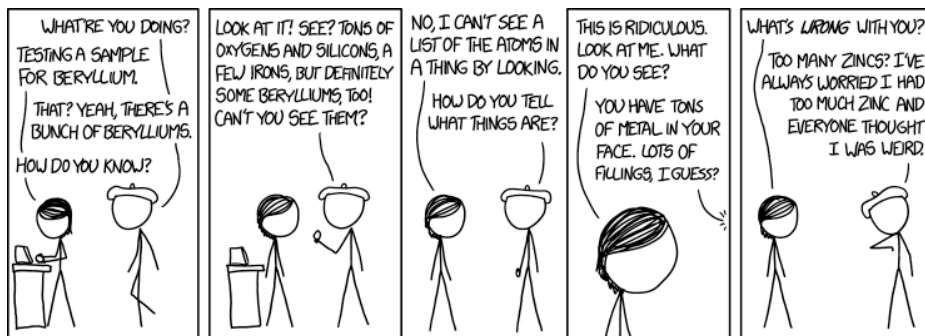
When I was little I had trouble telling my dad apart from the dog. I always recognized my mom because she had a bunch of extra plutoniums in her middle. I never did ask her why ...

Explanation

This comic shows another quirky and fantastical ability of Beret Guy. In this comic, Megan is preparing a sample of what appears to be some mineral for elemental analysis. It seems to be some kind of silicate containing a small amount of iron (a common example of this would be red sandstone), and she is running a test to see if it contains beryllium (a rarer element whose best-known natural form is as a component of emerald). Such analyses typically involve many instruments and steps to prepare the sample. However, Beret Guy seems to be able to identify all the elements the substance is composed of just by eyeballing it, making him perhaps the perfect elemental analysis instrument.

To confirm this, Megan asks Beret Guy what he sees when he looks at her face, expecting that a normal person would describe the arrangement of colors and features that they see. Since Beret Guy sees the atoms Megan is composed of (mostly oxygen, carbon and hydrogen) he only notices the unusual atoms. In this case he sees the metal atoms her dental fillings are composed of. This shows his "atomic vision" extends beyond the surface of the substances. Megan finds this bizarre and asks Beret Guy what is wrong with him. He states that he has always suspected he contains too much zinc, which he believes makes people think he is weird, thus missing Megan's point: what is weird is not Beret Guy's elemental content, but his ability to apparently see everything as atoms sorted by element. He even describes himself as

having "too many zincs" rather than "too much zinc", i.e. he's thinking of it in terms of discrete atoms.

High zinc intake (zinc toxicity) can cause nausea, vomiting, pain, cramps and diarrhea. It also reduces copper absorption, which affects the immune system. However, it does not grant superhuman sensory abilities.[citation needed] That is solely a function of tin.

The comic continues the theme of Beret Guy's naive misunderstandings of scientific terminology turning to be literally true. In a previous comic his misinterpretation of the notion of energy in the vacuum resulted in him gaining significant superpowers.

In the title text, the concept is taken even further: Beret Guy found his dad indistinguishable from a dog. This is likely because all mammals are essentially made of the same basic elements. Absent a distinguishing element from either his dad or the dog, they would appear to be the same. He could, however, apparently distinguish his mother because she contained plutonium. This is a very unusual occurrence; a human body should not contain more than a few atoms of plutonium, based on its natural synthesis, and those should be roughly the same in all bodies. Some possible explanations are:

It is also possible that Beret Guy's mother containing plutonium is probably intended as a whimsical explanation of his powers. The presence of plutonium in his mother may be the source of his own differences: radioactive exposure (in this case, potentially in utero) is

a common source of superpowers in comic books and other fiction (though unfortunately, this does not work in real life[citation needed]). It's possible the plutonium is even in her womb, therefore basically guarenteeing his exposure to it.
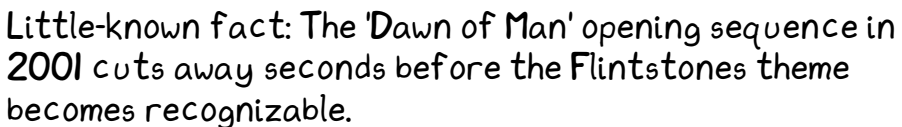
It's not clear whether his mother's plutonium is related to his "too many zincs". One explanation for Beret Guy having too much zinc could be that his mother's plutonium changed into zinc through the process of radioactive decay.

It is worth noting that the verbs "recognized" and "had" in the title text are written in past tense. This presents the possibility that Beret Guy's mother passed away due to radiation sickness from exposure to the radiation originating from the plutonium in her middle. This possibility is further evidenced when Beret Guy adds "I never did ask her why...", indicating that he may no longer have the opportunity to do so. This is further corroborated by 502: Dark Flow, where Beret Guy also appears to miss his mother.

The English physicist Henry Moseley discovered the law relating the atomic number of elements with their characteristic x-rays when bombarded by free electrons, providing physical evidence for the periodic table, the Bohr Model of the atom and the concept of atomic number. In doing so he developed a method of identifying elements in a substance by bombarding them in a vacuum with electrons and using x-ray diffraction methods to measure the resulting X-rays. A famous

French chemist brought him a complicated mixture of Rare Earth elements, many of which had only recently been discovered, to test his method. Within a short time, Mosley amazed the chemist by identifying all the elements by number using his method and referring to his chart to name them. This comic may therefore be subtly alluding to this method by suggesting that Beret Guy's eyes can fire electrons at anything he looks at and "read" the resulting X-ray radiation, giving him the ability to identify the composite elements in a similar manner.

#1491: Stories of the Past and Future

February 25, 2015

Little-known fact: The 'Dawn of Man' opening sequence in 2001 cuts away seconds before the Flintstones theme becomes recognizable.

Explanation

It's long been common for narrative works to be set in the past, and this tendency goes back to ancient mythology. The opposite approach, setting a work in a speculative future, has been less common prior to modern times. The oldest example Randall presents is from 1733, but it didn't really become a trend until well into the 19th century, and didn't become really common until the 20th century.

For works set in the future, particularly in the near future, there's a real possibility that audiences will still read or watch it past the date in which is was set, allowing them to compare the real world of this era to the one the author projected. This doesn't make the work less valuable, necessarily, but it does make the limits of such speculation painfully obvious, and tends to make the future presented there look dated and quaint. Randall labels these futuristic works as "obsolete".

For works set in the past, there's an opposite and somewhat more subtle effect. Once the work itself is old enough, audiences tend to forget that they were intended as historical fiction in the first place. If an old work is set in the past, it's often assumed that they were set in their own time, not in the still more distant past. That impacts how we experience the work, because we tend to assume that it's a faithful representation of its own time, not a later interpretation that was intended to be old (and possibly nostalgic) even in its own time.

On top of this, in a similar situation to the failed attempt at futurology, for future-facing works of fiction, even a conscientiously faithful 'historic' film can age badly. Later understanding of previously hazy historical situations can be developed between the time of the fictional work being authored and your experience of it.

To demonstrate those impacts, this chart sorts various works by the year they were created, graphed against how far in the past or future they were originally set. Lines on the chart are added to separate when each work ceases to work as either a prediction or as a period piece. For future works, the cut-off is obvious: if it was set in a year prior to the current year, we know that the predictions are obsolete (and can easily determine how accurate or inaccurate that future is). Hence, at the time the chart was written (in 2015), works like 1984 and 2001: A Space Odyssey are obsolete, while works like Star Trek, which take place in a more distant future, are still theoretically possible. (Back to the Future Part II is deliberately right on the line, as it was set in 2015).

For the past works, Randall sets the cut-off as when the work itself is older than the events in question were when it was first written/made. Hence, modern audiences are unlikely to realize that the Epic of Gilgamesh was intended to sound ancient, even when it was new, or that novels like Les Miserables were intended as historical fiction, or even that films like Chinatown or shows like Happy Days were intended as period pieces when they were made. To modern audiences, we just see an old work set in an old time, and tend to assume that the two

periods were the same.

The setup of the chart points to the reality that, in process of time, more and more works will cross those lines. Future audiences will likely assume that films like Apollo 13 and Schindler's List were made around the time of the events in question. And modern science fiction works, if they're still remembered in the future, will become just as obsolete as past works. And Randall even indicates "this chart" on the chart, apparently acknowledging that it will become dated as time goes by.

The title text jokes that 2001 cuts from prehistoria to the future before The Flintstones theme can become recognizable. This references the fact that, despite being primarily set in what was then the future, the film opens in the ancient past, thus appearing in both parts of the graph, with one part being very close to The Flintstones. This plays on the fact that one of these was a very serious work and the other a playful animated show that was intended as family comedy.

How to read the graph[edit]

- X-axis: Date of publication.
- Y-axis, "Years in the future": Number of years the story's events take place, after the story's publication.
- Y-axis, "Years in the past": Number of years the story's events take place, before the story's publication.
- Grey area in the "Years in the future" part: Stories set in the future (relative to their publication date), for which the date of

the events in the story is already in the past (relative to the publication date of the comic). The white and gray areas in this part of the graph are defined as "still possible" and "obsolete", respectively. The gray area (obsolete) will expand over time, assuming more works aren't added in the future: predictions from science fiction or futuristic work that are not confirmed by reality are doomed to be obsolete.

- Grey area in the "Years in the past" part: Stories set in the past (relative to their publication date) but published closer to their setting than to today. The warning "Modern audiences may not recognize which part were supposed to sound old" is a recurrent theme in the author's work, being already formulated in Period Speech comic. The white area seems to be the region where modern readers will be able to distinguish the past setting of a work from the age of the work itself. This gray area will grow over time (again assuming new works set in the past are not added) with more and more works being indistinguishable as works set in the past.

Taking the "years in the past" on the y-axis to be read as negatives like in most graphs one can write

- Dates on the lower line satisfy the equation $y = x-2015$. Corresponding works were published in the year $x = 2015+y$ and are set in the year $x+y = 2015+2y$.

- Dates on the upper line satisfy the equation $y = 2015-x$. Corresponding works were published in the year $x = 2015-y$ and are set in the year $x+y = 2015$.

Thus it's clear that the definitions of the lines are consistent with each other as they follow similar but inverted functions.

The graph uses variable logarithmic scales, adjusting the scale in various regions to the temporal density of works being plotted. If the scale were linear, the graph would in fact represent a (bidimensional) Minkowski diagram, which depicts the moving cones of past and future in spacetime as one's present advances in time.

Works listed[edit]

Differences listed in bright red are "former period pieces." Differences listed in dark red are other works set in the past. Differences listed in bright green are "obsolete" works set in the future. Differences listed in dark green are other works set in the future.

Asterisks (*) after a year of publication denote that it applies to the first installment in a series that spanned more than one year.

You can sort by a specific column in this table by clicking on its header.

#1492: Dress Color

February 27, 2015
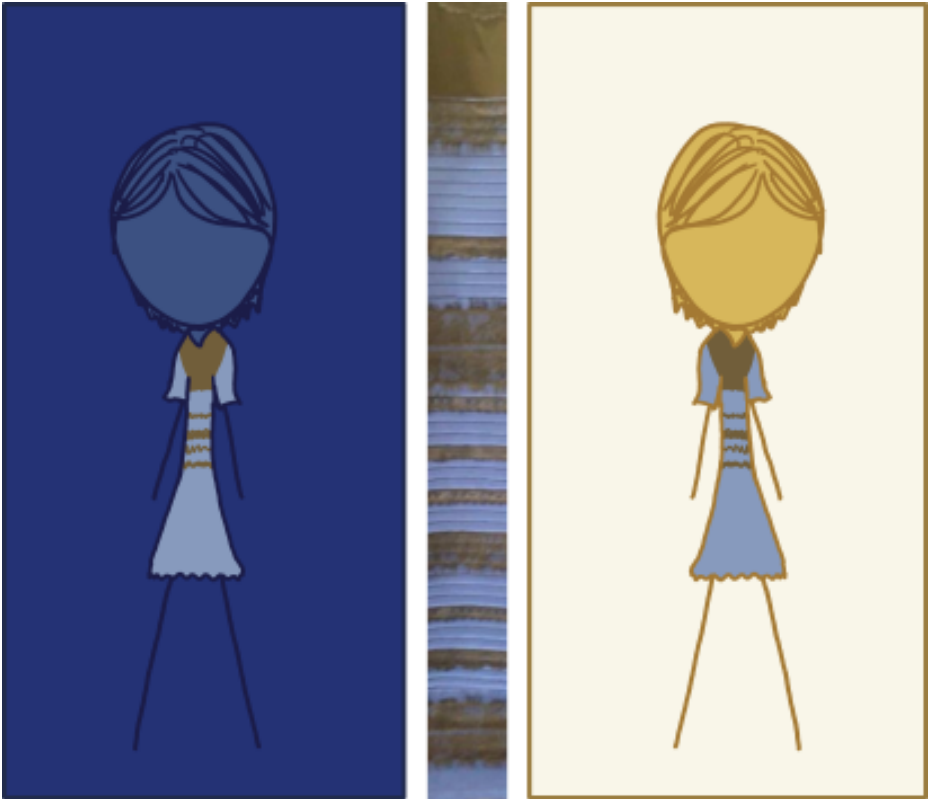
This white-balance illusion hit so hard because it felt like someone had been playing through the Monty Hall scenario and opened their chosen door, only to find there was unexpectedly disagreement over whether the thing they'd revealed was a goat or a car.

Explanation

This comic shows two drawings of a woman wearing the same dress, but with different background (and body) colors. The two drawings are split with a narrow vertical portion of an image from the web.

The comic strip refers to a dress whose image went viral on Tumblr only hours before the strip was posted and soon showed up also on Reddit, Twitter, Wired and on The New York Times.

Due to the dress's particular color scheme and the exposure of the photo, it forms an optical illusion causing viewers to disagree on what color the dress actually seems to be. The xkcd strip sandwiches a cropped segment of the photographed dress between two drawings which use the colors from the image against different backgrounds, leading the eye to interpret the white balance differently, demonstrating how the dress can appear different colors depending on context and the viewer's previous experiences.

Both dresses have exactly the same colors actually:

• RGB 113, 94, 58 (orange)
• RGB 135, 154, 189 (blue)

Below is an illustration demonstrating that the "colors" of the dresses (link no longer active?) are the same by connecting them with two lines with the above-mentioned colors (all the way!) and another which

has one side flipped and merged into the other:

Similar types of illusions can be seen at Wikipedia's optical illusion page and echalk.

This image has sparked surprisingly heated debate in many internet communities. A select few individuals may have prior experience with optical illusions of this ilk, but because this particular image went viral - it got heavy exposure over such a short amount of time - it reached millions of people who aren't so familiar with these sorts of mind tricks. To the uninitiated, the color of the dress seems immediately obvious; when others cannot see it their way, it can be a surreal (even uncomfortable) experience.

As an aside, the retailer Roman Originals would later confirm the dress was blue with black lace, and that a white dress with gold lace was not offered among the clothing line.

The title text refers to the game show Let's Make a Deal, hosted by Monty Hall, which was famous for having contestants pick among several doors which either had a real prize (for example, a car) or a joke prize (for example, a goat). Randall states that people find the dress color issue just as baffling as if upon opening the chosen door no one can agree if the item behind the door is a car or a goat. This is a reference to what has become known as the "Monty Hall problem:" if there are two goats and a prize behind three doors, the contestant has chosen a door, and one of the unchosen doors is opened to reveal a

goat, should the contestant change his/her choice? Statistically, the answer is yes, but many people find this counterintuitive; discussion of this problem in Parade magazine touched off public outrage similar to the viral dress image.

Randall is presumably pointing out how ridiculous it is for people who don't understand the underlying science to become so adamant in defending their beliefs. A spoof of the "Monty Hall problem" previously appeared in 1282: Monty Hall, where Beret Guy decides to take the goat.

#1493: Meeting

March 02, 2015

Panel 1: WELCOME TO A MEETING! I'M ALMOST OUT OF WORDS SO I'LL KEEP THIS SHORT. JUST WANNA TOUCH BASES.

COMPANYNAME.WEBSITE

IF YOU'RE READING THIS, THE WEB SERVER WAS INSTALLED CORRECTLY.™

Panel 2: FIRST, A FEW UPDATES. WE'VE LEARNED FROM THE STATE POLICE THAT THE SELF-DRIVING CAR PROJECT WE LAUNCHED BY ACCIDENT DURING THIS MORNING'S CARPOOL HAS COME TO AN END ABOUT 90 MILES OUTSIDE OF TOWN.

VERY EXCITING!

Panel 3: PROFITS ARE UP. SALES, ANY LUCK FIGURING OUT WHO OUR CUSTOMERS ARE?

NOPE. MONEY KEEPS APPEARING, BUT WE HAVE NO IDEA HOW OR WHY.

GREAT!

Panel 4: OH, AND ONE LAST THING— I SAW A COOL RED BEETLE IN THE HALL. CAN SOMEONE ADD IT TO THE BUG TRACKER?

JUST DID!

THANKS!

Here at CompanyName.website, our three main strengths are our web-facing chairs, our huge collection of white papers, and the fact that we physically cannot die.

Explanation

Beret Guy's business, as previously seen in 1032: Networking and 1293: Job Interview, is going well, although it is unclear why. The common theme in these three comics is that Beret Guy misuses common business cliches. The following are examples and phrases that Randall is likely making a joke about:

- "If you're reading this, the web server was installed correctly.™" When a web server is installed automatically (like Apache through a package manager), it typically comes with a minimal configuration meant to deliver a single page saying all is working fine. Usually, a company will then configure the web server to provide actual meaningful content, such as contact information and a list of the company's services. It appears that in this case Beret Guy's company kept the page as is, but also trademarked the sentence as the company's motto, and proudly displays it under the company logo.

- "CompanyName.website": Companies are usually given descriptive or evocative names; Beret Guy's company, meanwhile, has been given a generic placeholder name that explains nothing about the company or website except that it is a company with a website. Currently, almost every middle-sized company runs a website, so it doesn't mean Beret Guy's company is in the information technology business (but many elements are specifically parodying Google).

"Companyname.website" redirects to xkcd.com.

- "Welcome to a meeting!" The usual way to start a meeting is to welcome the participants by telling them in which meeting they are (e.g. "Welcome to the meeting on..."). Here, the complete lack of specifics in this sentence is an indication that the meeting has, in fact, no purpose at all, except to be just "A meeting". It could also mean that Beret Guy does not know the proper way to welcome people to a meeting.

- "I'm almost out of words so I'll keep this short." A common theme in the busy world of business is lack of time, so "I'm almost out of time" would be a valid reason for keeping a meeting short, rather than a finite quantity of words. Aside from the fiction movie A Thousand Words or people taking a Vow of Silence, people usually don't have a particular quota on the number of words they have or can use. Beret Guy also seems to run out of words in the title text of 1560: Bubblegum. The characters also seems to run out of numbers in 3009: Number Shortage.

- "Just wanna touch bases." Often business professions will contact a customer to "touch base," meaning to check in for a status update. The use of the plural "bases" suggests Beret Guy does not know what this means. This could also be a word play on the expression "Cover some bases".

- "Self-driving car project" Google has been working on self-driving cars, which usually shouldn't be lost track of and found by the police. The fact that it was launched "by accident" is concerning. It could mean the

car was turned on by mistake and then left unattended, or perhaps that a driver of one of their cars fell asleep or otherwise stopped controlling the vehicle, or Black Hat left a large boulder in one of the seats and sent it off to Anchorage, Alaska, but it is not clear because the accidental launch may refer to the project itself rather than the car. The involvement of the police may imply that the car crashed or otherwise obstructed traffic. That said, 90 miles before crashing was at that time a good result for a self-driving car, especially when you didn't even know you built a self-driving car. What's especially ironic is the implication that the employees were carpooling (sharing a single vehicle for their commute, for reasons of efficiency/economy) in the self-driving car, and yet this carpool activity ended with the car setting off with nobody in it at all. These types of cars were the topic of the later comic 1559: Driving, maybe misusing one of Beret Guy's cars. Self-driving cars are a recurring topic on xkcd.

- "Sales, any luck figuring out who our customers are?" In the real world, when companies want to find out "who [their] customers are", they are talking about learning more about their existing customers (e.g. age groups, interests, genders) in order to more closely match these customers' needs, and to discover ways to attract more of them. Here, Beret Guy and Ponytail apparently use the phrase literally - they have no records of making any sales. A normal enterprise struggles to sell its products/services in order to get money. Getting cash from an unknown source would lead to serious troubles - failure to comply with tax code, suspicion of

money laundering - but overall, most enterprises suffer the opposite problem: they try as hard as they can but don't get enough cash to be profitable (despite keeping precise information about where cash comes from). Note, that the accidental launching of a project would suggest a theme, that large cash infusions for unknown or unscrupulous reasons could imply anonymous VC investors, perhaps amateurs or acting in an overheated market.

- "Bug tracker" usually refers to systems for tracking discovery, analysis, and fixing of software bugs (errors and problems), not the physical location of insects.

- "Web-facing" (title text) usually refers to software or a server that is connected to the internet using a web interface. However, in this case, the term is applied to chairs (likely meaning that they are either materially web-plaited or placed in front of a computer with internet browsing capability, or both; may also possibly refer to other definitions of "web").

- "White papers" (title text) are usually policy recommendations, but here Beret Guy is likely talking about actual (near-worthless) blank white pieces of paper.

- "Main strengths" (title text) typically refer to one's skills, but "we physically cannot die" may refer to the fact that incorporated companies are in a sense anthropomorphized — they're legally treated as "persons", with the ability to sue and be sued in civil courts; or, just as likely, that Beret Guy and his employees are literally immortal, in which case that

would indeed be a great asset which could be used in a variety of ways, such as economizing on costs of living, participating in physically dangerous projects with impunity, or investing for a long, long time.

#1494: Insurance

March 04, 2015
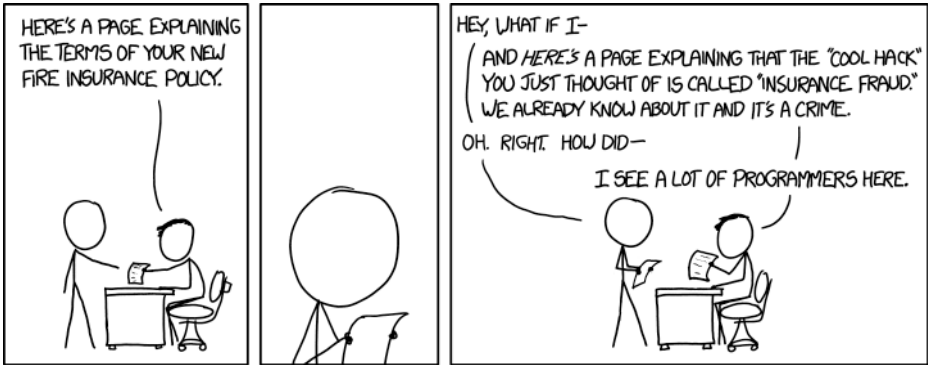
LIFEHACKS: You can just take all the luggage off the airport conveyer belt and leave with it. They don't check that it's yours at the door!

Explanation

Cueball, apparently having just purchased a new insurance policy, is given a document explaining the policy terms. As is often the case, he's presented as some sort of programmer or at least logically minded person. He reads through the terms that are handed to him, and finds some sort of loophole. This is a play on the fact that programmers tend to look for loopholes in programs, code and system architecture, and treat finding them as a challenge (either to exploit them, or to prevent such exploitation by other parties). The fact that Cueball is trying to discuss his findings with the agent suggests that he's trying to prevent it from happening, rather than planning to do it himself.

In this case, the obvious "loophole" in a fire insurance policy is that the customer generally receives a large payment in the event of a fire. This means that a person could make money by insuring a building or other property for more than its actual value, then deliberately setting a fire. Alternatively, someone could set a fire and claim that more valuables were destroyed than actually were. In either case, the customer would effectively receive free money for their troubles. In principle, this could be done repeatedly, resulting in an unlimited source of money.

All of this is implied simply by Cueball reviewing the document, starting to ask a question, and being cut off by the agent, explaining that this "cool hack" is actually

just an instance of insurance fraud, which is a) well known and b) highly illegal. In practice, insurance companies are constantly on the lookout for such forms of fraud, and attempting to do so in real life would be more likely to land you in prison than to enrich you.

The comparison here is that exploiting a program's faults can be regarded as interesting or fun, while exploiting the faults in a legal document will often result in some sort of legal repercussions. Moreover, most such exploitations that involve money have usually been figured out already, and systems changed or laws passed in order prevent them from happening. When they do occur, the exploiter is subject to legal punishment.

Cueball begins to ask how the agent knew what his question was, and is again cut off by the agent explaining that he sees a lot of programmers, suggesting that Cueball is not the first to consider that particular loophole. The idea that there are many people on the lookout for and eager to try exploits that turn out to be fraud may seem absurd at first, which is part of what contributes to the comic's humor, but in 2024, an exploit that many participants apparently did not realize is check fraud went viral on TikTok.

The title text provides another example: US airports typically place passengers' luggage on carousels, and leave it to the individual travelers to find and retrieve their own luggage, which would seem to make it easy to take luggage that's not yours (even "all the luggage"), but that's less of a 'hack' than a crude form of petty theft,

which contravenes both the law and normal social and ethical expectations.

It should be noted that there are places in which it's typical for airports to verify luggage ownership before allowing people to take their bags. In most wealthy countries, this practice has largely been abandoned, because other peoples' luggage isn't typically very valuable, airports are generally fully of security cameras, and walking off with a random piece of luggage creates a significant risk that the actual owner will see you trying to take it. For these reasons, the risks associated with such theft generally outweigh the rewards. A single person trying to remove "all the luggage" would be particularly impractical. Even if they could contrive a method to transport it all, their actions would be so obvious that they would almost certainly be caught immediately.

The core point, in both of these cases, is that theoretical loopholes, which might be easy to exploit in computer code, are usually wildly impractical in reality, and often carry both moral implications and the risk of punishment.

1469: UV also contains a case of insurance fraud.

#1495: Hard Reboot

March 06, 2015

FIGURING OUT WHY MY HOME SERVER KEEPS RUNNING OUT OF SWAP SPACE AND CRASHING:

1-10 HOURS

PLUGGING IT INTO A LIGHT TIMER SO IT REBOOTS EVERY 24 HOURS:

5 MINUTES
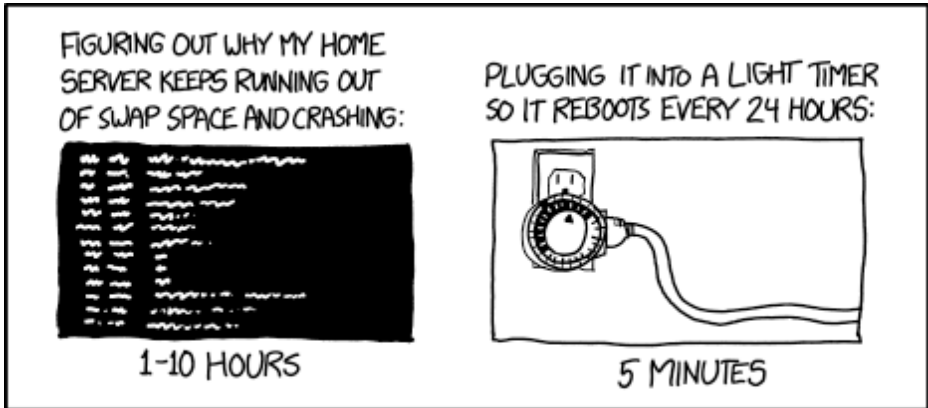
WHY EVERYTHING I HAVE IS BROKEN

Googling inevitably reveals that my problem is caused by a known bug triggered by doing [the exact combination of things I want to do]. I can fix it, or wait a few years until I don't want that combination of things anymore, using the kitchen timer until then.

Explanation

Swap space is an area of a computer's hard drive reserved for use when the computer runs out of RAM. Ideally, RAM + SWAP >= MAX, where MAX is the amount of memory the computer will ever try to use at the same time. However, some (broken) programs may keep requesting memory from the system until computer runs out of resources (a memory leak), or the system may be misconfigured to run more and more programs simultaneously. Rebooting the computer will empty the RAM and swap space so resources can be reallocated, but this only temporarily alleviates the underlying issue. Determining the root cause of the problem is often nontrivial.

It would take Randall anywhere between 1 and 10 hours to figure out why the server is running out of swap space, and possibly more to actually fix the problem. Alternatively, Randall could just take 5 minutes and plug the server into a light timer. This attitude to problem solving is in contrast to the attitude shown in 974: The General Problem.

Timers like the one in the comic typically have four switches or notches per hour, so using the timer would replace an unpredictable and indefinite loss of service with a regular 15 minute downtime event once a day. Also, it can be scheduled during, say, the middle of the night when most users are sleeping to minimize disruption.

The correct method of scheduling a regular reboot would be using a cron task, but perhaps the server is "crashing" in such a dramatic manner that cron, or shutdown, or init stops working. The comic title alludes to this, in that a "hard" reboot scheduled with an analog timer is more guaranteed to work than a "soft" one scheduled with cron.

If a memory leak is not present, the problem might be fixable by simply increasing swap space; however, if there is a more complex underlying issue, this is the first step along the path of 10 hours of troubleshooting. As a general stereotype, the type of person who has a home server is probably also the kind of person who would start by 'just' increasing the swap size, and before they know it has spent 10 hours completely engrossed in the challenge of fixing the problem. (See 349: Success)

The subtitle reads "Why everything I have is broken". This indicates that Randall frequently finds himself doing non-standard workarounds that temporarily solve a problem but may ultimately damage the system to the point of becoming nonfunctional. Indeed, a kitchen/light timer used to cut power to a server overnight may affect the server's performance if it is in the middle of a process when the reboot happens. Alternatively, this can be interpreted to mean that everything Randall has is broken and held together by metaphorical duct tape.

The title text's first sentence reveals that Randall is aware that looking further for a fix is futile: The problem is

caused by a bug which has already been analyzed and is known to be triggered by using the system in the very way Randall is using it. He may get around the bug by changing what the system does, but then it would not provide the services he needs anymore. It may also refer to bug trackers, where someone found out and posted what causes the issue, but the bug is marked as "Unresolved," "Waiting," or "Will not fix."

It is not clear why the title text refers to a kitchen timer while the comic itself refers to a light timer. It might be a small error, or it might be that Randall just considers these to be two synonymous terms. Typically, however, a kitchen timer refers to an alarm that will go off, rather than a timer that cuts power to a device like a light timer.

The title text's second sentence refers to the fact that operating system bugs take a long time to be solved, hence the solution of "wait[ing] a few years until I don't want that combination of things anymore." Humor in that sentence is found in the fact that readers will anticipate "wait a few years until..." would be followed by "the bug is fixed", however, Randall is indicating that usually his needs change before the bugs get fixed, or that he has very low confidence in that the bug will be fixed in time, if ever.

#1496: Art Project

March 09, 2015
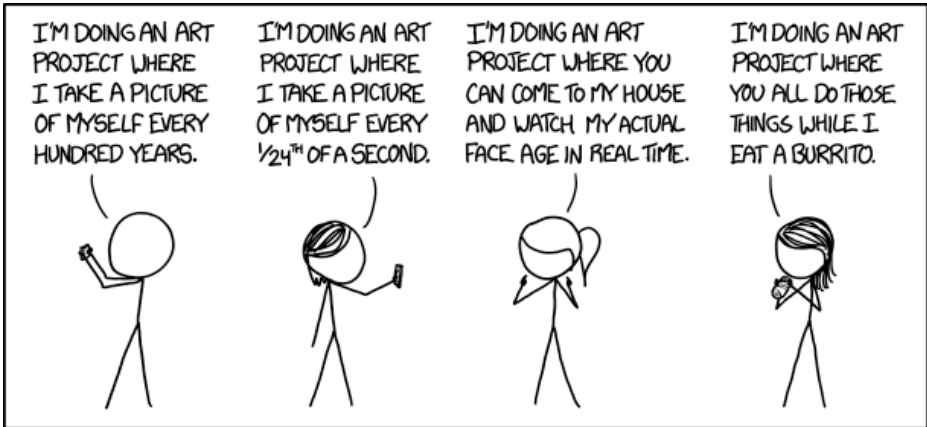
It's my most ambitious project yet, judging by the amount of guacamole.

Explanation

This comic appears to be satirizing art in two different ways. From one perspective, Randall is describing various art forms in unusual ways (e.g., a portrait by Cueball, a video for Megan, and perhaps live performance by Ponytail). From another perspective, Randall might be making fun of time-lapse photography movies. YouTube has a robust collection of videos taken from stitching together pictures or short video clips taken every day or every week; in the 2015 Academy Awards, one of the Best Picture nominees, Boyhood, used a similar method, filming short sequences annually over the course of 12 years. In each case, the art described is simpler than it sounds, and some might not consider it art. A picture of oneself "every hundred years" will only happen once or twice in a lifetime; a "picture every 1/24th of a second" is the traditional frame rate of cinema cameras for film production, and "watching my face age in real time" is just life.

Then finally another Megan-like character, possibly a relatively demure Danish, pokes fun at all of them by simply watching their attempts at "art" while she eats a burrito. This might be in parallel to Andy Warhol's piece of art "Man eating a Hamburger". Randall may also be referencing the many perspectives on art by leaving this comic open to several interpretations. The use of a burrito as a punchline representing someone who is grounded in reality instead of engaging in esoteric pursuits has been seen before in 1269: Privacy Opinions.

The title text is just more snarky, claiming that it's their most ambitious project ever, if the sole criterion for ambition is the amount of guacamole that one has to eat.

#1497: New Products

March 11, 2015

PREDICTING THE SUCCESS OR FAILURE OF A NEW PRODUCT
BASED ON WHAT ENGINEERS AND PROGRAMMERS ARE SAYING ABOUT IT.

IF THEY SAY...	IT MEANS...
"IT DOESN'T DO ANYTHING NEW" "WHY WOULD ANYONE WANT THAT?"	THE PRODUCT WILL BE A GIGANTIC SUCCESS.
"REALLY EXCITING" "I'VE ALREADY PREORDED ONE."	THE PRODUCT WILL BE A FLOP. YEARS LATER, ITS IDEAS WILL SHOW UP IN SOMETHING SUCCESSFUL.
"WAIT, ARE YOU TALKING ABOUT \<UNFAMILIAR PERSON'S NAME\>'s NEW PROJECT?"	THE PRODUCT COULD BE A SCAM AND MAY RESULT IN ARRESTS OR LAWSUITS.
"I WOULD NEVER PUT \<COMPANY\> IN CHARGE OF MANAGING MY \<WHATEVER\>."	WITHIN FIVE YEARS, THEY WILL.

If you ever hear "Wait, is that Kim Dotcom's new project? I'm really excited about it and already signed up, although I'm a little nervous about whether everyone should hand over control of their medical...", it's time to dig a bunker in your backyard.

Explanation

This comic points out an apparent paradox in product performance: Many products that are criticized by techies when first announced go on to great success, and many that are heavily hyped are total flops. The product in question may be a reference to the Apple Watch, which was announced around the time of this comic's release.

The title text imagines a product that fits into the second, third and fourth categories:

- "Wait, is that Kim Dotcom's new project?" — third category
- "I'm really excited about it and already signed up." — both options from the second category
- "Although I'm a little nervous about whether everyone should hand over control of their medical..." — fourth category

Kim Dotcom is a controversial entrepreneur and convicted fraud. He changed his surname to "Dotcom" because of the dot-com stock market bubble that made him a millionaire. He fits perfectly into the mold of someone well-known to programmers and engineers (as well as New Zealanders), but perhaps not so much to your average Joe.

Taken together, these imply that an untrustworthy and potentially malicious company has an exciting new idea

that may eventually come out in successful form, gains control of a large amount of medical information, but ultimately result in lawsuits not just from investors but from misled consumers (category 3). Because the initial release will be a flop (category 2), there is some time to prepare before the successful use of this idea becomes a reality (also category 2), at which point that or some other company will gain control of a large amount of people's medical something (category 4). Once this happens you could expect dramatic repercussions; this is why the title text suggests to dig a bunker while there is still time.

#1498: Terry Pratchett

March 13, 2015

I told her we were going to get married, and all she could talk about was frogs.

She said there's these hills where it's hot and rains all the time, and in the rainforests there are these very tall trees and right in the top branches of the trees there are these like great big flowers called . . . bromeliads, I think, and water gets into the flowers and makes little pools and there's a type of frog that lays eggs in the pools and tadpoles hatch and grow into new frogs and these little frogs live their whole lives in the flowers right at the top of the trees and don't even know about the ground, and once you know the world is full of things like that, your life is never the same.

—Masklin, Terry Pratchett's **The Bromeliad Trilogy**
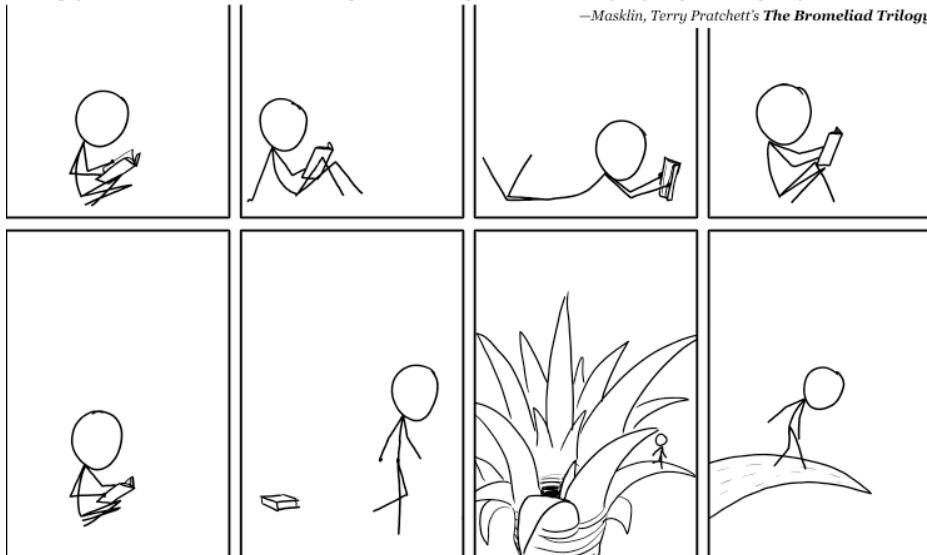
Thank you for teaching us how big our world is by sharing so many of your own.

Explanation

During the first five panels of the comic Cueball reads the quoted passage in his book Wings. This passage describes what Masklin thinks about when he told Grimma that they "were going to get married, and all she could talk about was frogs." He then recounts what she told him about a type of tree frog that are found in bromeliad flowers where they lay their eggs, which hatch into tadpoles, and then live most of their lives in a single plant. See a description of this plot point when it happened in Diggers. She—amongst other things—muses about the fact that they are blind to the rest of the Universe, and that most people are blind to them.

After reading this Cueball puts the book down and walks off, and soon finds that he himself has been living at the bottom of a flower much like the frogs in the bromeliad. This is an allegory for a common praise of the best fantasy and science-fiction writing: That by reflecting our own world in a different context, it allows us to better see ourselves. In the allegory, Cueball's journey to the edge of the leaf is a representation of broadening one's horizons, perhaps even in ways that are somewhat frightening.

On a more literal level, the concept of living on a flat surface with a precipice at the edge is explored at length in the Discworld series, Pratchett's most iconic work. Both this series (wanting to own it all) and the space all

of Terry Pratchett's books would take up on a bookshelf are the subject of 625: Collections. The title text continues, more directly, the point previously made allegorically. It thanks the late Sir Terry, noting that his fictional worlds allowed us to better see the real world. "How big our world is" also ties into another point raised in the quoted passage, that there are countless amazing things happening around us all the time without our knowledge. Terry Pratchett was also referenced in panel 18 of 1052: Every Major's Terrible. A similar tribute comic was also dedicated to Steve Jobs, the day after he died, in 961: Eternal Flame, to Gary Gygax, three days after he died, in 393: Ultimate Game, and to John Conway, two days after he died, in 2293: RIP John Conway.

#1499: Arbitrage

March 16, 2015
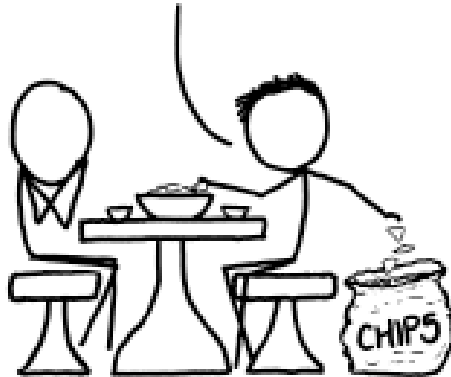
The invisible hand of the market never texts me back.

Explanation

In economics and finance, arbitrage is the practice of buying cheaply on one market whilst immediately selling at a higher price on another market, taking advantage of the price difference to make relatively risk-free profit. In real-world liquid financial markets, arbitrage helps the market to converge on one price for a product. Arbitrageurs are the individuals performing this act to equalize the prices in those markets and hopefully make a profit.

The place where Cueball and Hairy are eating is giving away unlimited free potato/tortilla chips, probably serving the same function as a bread basket, being a cheap but welcome appetizer while patrons wait for their orders. Hairy is acting as an arbitrageur by collecting the chips to later resell them. This is much to the consternation of Cueball, who is (depending on how you interpret the simple art-style) holding his hands up in front of his mouth in shock, covering the lower half of his face in shame, covering his eyes out of denial, sliding his palms down the front of his face in disgust, face palming in exasperation, or eating chips – possibly all in sequence.

Trying this strategy in the real world would not work. Customers leaving the restaurant with bags of chips might well be barred from the establishment. More simply, the restaurant is under no obligation to keep refilling the bowls indefinitely; if a customer's demands

for more chips became unreasonable, they could simply refuse to bring any more. In either case, it's highly unlikely that a customer could leave with enough chips to offset the cost of even an inexpensive meal. Additionally, there would likely be a problem of a lack of demand, given the absence of a secondary market. Case in point: would you buy open bags of perishable, presumably hand-soiled chips? Didn't think so.

In the caption below the comic, Randall suggests that society only functions because we don't take people like Hairy "out to dinner"; we generally have an aversion to dealing with people with such extreme self-interest, bordering on sociopathic behavior. Traditional theories of capitalism are based on the concept that people will act in their own economic self-interest, but in reality this is usually limited by both legal strictures and unspoken social norms. There are many aspects of society that are only possible because we trust most people to keep their self-interested actions within reasonable bounds. We see from Cueball's reaction that he is appalled by what Hairy is doing in believing he can profit from the apparent generosity.

A distinguishing feature of social animals, rather than animals simply sharing a habitat, is that they perform tasks that benefit their group. All such societies rely on some situations where the individual is not working purely on short term self-interest. The payoff for this is generally that co-operation makes things better for the group as a whole. Most people would find Hairy's behavior embarrassing and shameful, and thus would not

socialize with people who behave like that. By rejecting such individuals, society protects itself from such people.

The title text mentions the invisible hand. In economics this is a metaphor used by Adam Smith to describe unintended social benefits resulting from the individual actions of self-interested parties. In the context of arbitrage, the invisible hand compels all of a given fungible substance to be sold for the same price, as a result of the actions of individuals like Hairy (or Black Hat in 958: Hotels) who are only seeking personal profit. The invisible hand is a sort of personification of the market; in the title text, the person has become so real that it can be sent a text message, but, despite presumably being able to hold a phone, the Hand doesn't reply (it IS only a hand). It is tempting to wonder why Randall/Cueball is texting it in the first place - not, presumably, to invite it to dinner, since the market would doubtless behave just as Hairy is doing. As it is invisible, though, perhaps it would at least be less embarrassing to sit at a table with.

#1500: Upside-Down Map

March 18, 2015

THIS UPSIDE-DOWN MAP WILL CHANGE YOUR PERSPECTIVE ON THE WORLD!

Due to their proximity across the channel, there's long been tension between North Korea and the United Kingdom of Great Britain and Southern Ireland.

Explanation

This comic plays on the idea that maps with the south pole at the top will "change your perspective of the world". Most world maps orient north in the upward direction, placing the north pole as the top. Such an orientation is purely a matter of convention, as 'up' and 'down' don't apply in a planetary context. The north = up tradition probably emerged because many historical cartographers hailed from the northern hemisphere, and placed their own nations at the top. Some people and groups object that this convention subtly, but perniciously, advances the assumption that countries in the northern hemisphere are inherently more important than those in the southern hemisphere. This is especially sensitive because most of the wealthier and more powerful countries in the world are in the northern hemisphere, while relatively fewer southern hemisphere countries have as much wealth or global influence.

To remedy this, some advocate the use of maps with the south pole oriented at the top. Some want such maps in common use, while others simply use them to encourage people to rethink their assumptions about how the world should be seen. Such a map can easily be achieved by simply rotating a normal map 180 degrees, though the text labels would also be upside-down and harder to read. A Google Images search reveals many examples of upside-down maps with the text-oriented correctly for reading.

This map is a comedic play on such maps, where each landmass is in the same position it would be in a traditional north-top map but rotated 180 degrees (presumably around some central point of the landmass) to the orientation it would have in a south-top map. Such a map is, of course, almost completely useless in real life, because it completely distorts the relative positioning of the landmasses. Moreover, it keeps the northern countries at the top of the map, which means one of the chief complaints about traditional maps is unaddressed.

Note that individual islands are rotated about their own centers, rather than following the rotation of the neighboring continent; however, some are displaced as necessary to keep them from being overlapped by the rotated continents. For instance, Madagascar would be overlapped by the Sahara if it remained in position, but is instead displaced eastward to keep it in the Indian Ocean. On the other hand, all the islands of the Mediterranean Sea have disappeared under Asia. A landmass that follows a different rule is the Sinai peninsula. Instead of remaining part of Eurasia, it followed Egypt in rotating around Africa, becoming a separately outlined island in the process.

Asia is so broad that almost the entire Indochinese Peninsula (with for instance Vietnam and Thailand) has been rotated out of the top of the map. Similarly, the map omits Antarctica in the south. Interestingly, Thailand in particular, presumably alongside the mainland portion of Malaysia at the tip of the Malay peninsula, has been omitted entirely, with the visible

Thai borders instead outlining the edge between land and sea. Also, the portions of Borneo owned by Malaysia and the country of Brunei are not delineated from the Indonesian parts.

To keep their familiar shapes on a rectangular map, the continents would also have to be heavily distorted compared to their actual shapes, becoming much narrower (along the lines of latitude) near the poles and wider towards the equator. See also 977: Map Projections.

The basic climates for several areas would be distinctly different. For example, the former Central America area would be in the arctic zone, while Siberia would be subtropical.

This arrangement of the world's landmasses would have great advantages for trade because there are (presumably navigable) straits between the Americas and between Africa and Asia, removing the need for the Panama Canal and the Suez Canal.

The title text references the fact that, in this new map, the UK is now next to Asia – specifically the Korean Peninsula. North Korea is mentioned in the text as having a history of hostile relations with nearby countries. However, on this map North Korea would be the part of Korea we today know as South Korea. Furthermore, Northern Ireland is now at the south of the island of Ireland, so the UK's full name would need to change to The United Kingdom of Great Britain and

Southern Ireland. There have been several wars concerning the English Channel, mainly, but not only, between England and France. Likewise, there has been a history of animosity between Korea and Japan, separated by a similar body of water. Since, on this world map, a channel now exists between the UK and North Korea (the real world's South Korea) there could obviously have been many wars for the dominance over the said channel.

Along the same line of thinking, interesting speculations could be made about the following "new" facts:

- Cuba is now off the east coast (formerly west coast) of Canada (and the USA).

- Japan is next to the coast of Portugal and Spain.

- Madagascar lies next to Morocco and Mauritania on the east coast (formerly west coast) of the Sahara.

- Taiwan (officially called the Republic of China) is now next to France. This might be a game-changer for the Cross-Strait relations, an ongoing rivalry with mainland China (officially called the People's Republic of China).

- Greenland lies next to Mexico.

- Sri Lanka is located next to the Yamalsky District of Russia.

- Tierra del Fuego, an island just south of the southern tip of South America, which is divided between Argentina and Chile, is now located in a similar manner next to Colombia and Venezuela, so it would probably have been divided between these two countries.

- The Falkland Islands (not named in the map – they are probably represented by the single island above the T in Tierra) where Argentina and the UK have an ongoing sovereignty dispute, could now be claimed by Ecuador or Peru.

- The Mediterranean islands seem to have vanished entirely, as they are now in approximately the same place as Mongolia.

- India is nowhere near the Indian Ocean.

- Norway almost touches the Philippines.

#1501: Mysteries

March 20, 2015

MYSTERIES

I HAVE NO EXPLANATION

NOT THAT WEIRD — WEIRD AS HELL

EXPLANATION SEEMS PRETTY CLEAR

WHO CARLY SIMON IS SINGING ABOUT IN *YOU'RE SO VAIN*
MH 370
DB COOPER
LEAD MASKS CASE
UVB-76
THE WOW SIGNAL
LINDBERGH BABY
TOYNBEE TILES
SALISH SEA FEET
JIMMY HOFFA
MARY CELESTE
ZODIAC LETTERS
VOYNICH MANUSCRIPT
AMELIA EARHART
LOST COLONY
JFK
KENTUCKY MEAT SHOWER
WHY I KEEP PUTTING ICE CREAM BACK IN THE FRIDGE INSTEAD OF THE FREEZER
OAK ISLAND MONEY PIT
BIGFOOT
LOCH NESS MONSTER
DYATLOV PASS INCIDENT

At the bottom left: The mystery of why, when I know I needed to be asleep an hour ago, I decide it's a good time to read through every Wikipedia article in the categories 'Out-of-place artifacts', 'Earth mysteries', 'Anomalous weather', and 'List of people who disappeared mysteriously'.

Explanation

This comic shows a graph in which several "mysteries" are mentioned and placed on the graph according to how weird they are on the x-axis and the y-axis indicates whether Randall has an explanation or not for the mystery. Each item is listed in the table below.

Items near the top-right corner (such as the MH 370 disappearance) are both mysterious and strange. Items near the bottom-left corner (such as Randall's absent-mindedness regarding ice cream) have a clear explanation and are not really strange either. Items near the top-left corner (such as the meaning of You're So Vain) are mysterious but not really strange. Items near the bottom-right corner (such as the Dyatlov Pass incident) have a clear explanation but are quite strange.

The title text refers to the mystery of Randall staying up late to read Wikipedia articles, when he was already supposed to be asleep an hour ago. This is apparently not very unusual for him (see for instance 214: The Problem with Wikipedia). And this mystery actually has an obvious explanation: Following up on an idea that eventually led to today's cartoon.

Some of these mysteries have already been explored in xkcd. See 950: Mystery Solved where Randall "solves" Amelia Earhart, Lost Roanoke Colony, Jimmy Hoffa; 593: Voynich Manuscript; and 1400: D.B. Cooper.

Note that Randall uses similar diagrams in both 388: Fuck Grapefruit, 1242: Scary Names and 2466: In Your Classroom, which also contain different items. The first two also have an extra point, and the last two extra points mentioned in the title text. But all these points are in the title text because they are far off the chart, whereas in this comic it's the description of the point that is too long to fit on the chart. Extra info outside the chart is also used in the title text of 1785: Wifi, but this is a line graph.

#1502: Wasted Time

March 23, 2015

Panel 1:
THIS NEW KEYBOARD IS LIKE 30% FASTER!

I'M NEVER GOING BACK.

Panel 2:
GOOD, PUT THOSE YEARS OF HORROR BEHIND YOU.

C'MON. SURE, SOMETIMES MY FOCUS ON EFFICIENCY DOESN'T MAKE SENSE. BUT WE TYPE A *LOT*.

Panel 3:
THAT 30% IMPROVEMENT PRETTY QUICKLY ADDS UP TO A *HUGE* AMOUNT OF WASTED TIME RESCUED.

Panel 4:
I JUST WATCHED YOU OPEN GOOGLE NEWS AND THEN CLOSE IT WITHOUT READING IT *FIVE TIMES IN A ROW*!

THE FACT THAT I SPEND MOST OF MY TIME SO STUPIDLY ONLY MAKES IT *MORE* IMPORTANT NOT TO WASTE ANY HERE.

Since it sounds like your time spent typing can't possibly be less productive than your time spent not typing, have you tried typing SLOWER?

Explanation

In this comic, White Hat is pointing out to Cueball that his obsession with efficiency is inconsistent, something that is likely true of many people who claim to prize efficiency.

Here, Cueball raves about his new mobile keyboard which allows him to type 30% faster than his old keyboard. He notes that people (presumably himself particularly) do a lot of mobile typing, and a 30% reduction in the time that takes would allow more time for other activities.

White Hat, on the other hand, mocks Cueball for caring so much about mobile typing speed, suggesting that this may not be the first time Cueball has obsessed over minor improvements in efficiency. White Hat also notes that he's just seen Cueball open and close Google News five times without reading anything, providing an example of how Cueball's other actions do not embody the same commitment to efficiency that he claims to have.

Cueball defends himself by saying that, since he wastes so much time, it's that much more important to improve efficiency in his life to make more time for important matters. The title text (presumably White Hat's reply) counters this defense by suggesting that Cueball may be better off using a slower keyboard, so that he will have less time to waste on stupid activities. This type of

argument may be an example of a logical fallacy argument which suggests, perhaps incorrectly, that Cueball should spend less time doing stupid things to the extent that he spends longer doing things he already does.

Interestingly, in this comic, White Hat appears as the voice of reason to Cueball, an inversion of their typical dynamic (see for instance 1386: People are Stupid and 1459: Documents). The role-reversal may be an acknowledgment that while Cueball may often make a fool of White Hat, he's far from perfect himself.

Randall's misadventures in time management are a recurring topic (see 874: Time Management and the Time management category).

Mobile keyboard efficiency was previously tangentially referenced in 1068: Swiftkey, and Randall's habit of opening news sites only to quickly get bored or distracted was shown in 1411: Loop.
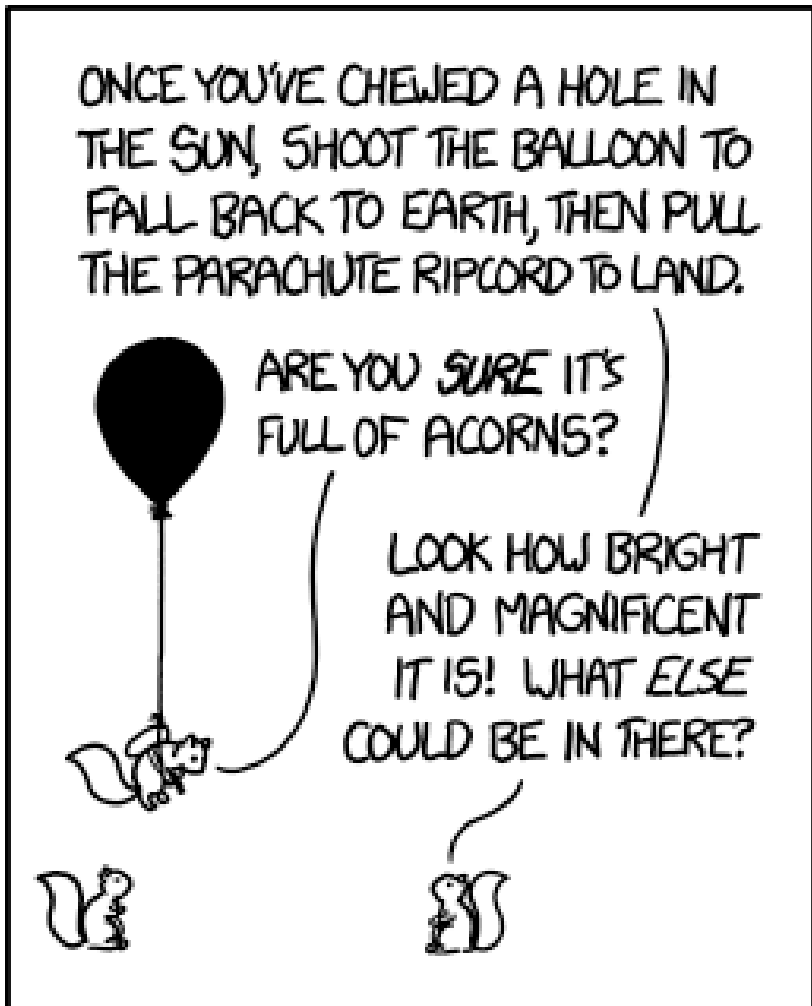
[Halfway to the Sun ...] **Heyyyy** ... what if this **BALLOON** is full of acorns?!

Explanation

These particular squirrels are ambitious but misguided, like the characters in the myth of Icarus and Daedalus (it should be noted that Randall does not see it that way, as seen in the bottom of "Interplanetary Cessna"), or the Tower of Babel. The squirrels' understanding of astrophysics is lacking,[citation needed] regarding the distance to the Sun and appropriate transportation to reach it in addition to the need to resist the sun's heat and exist in the vacuum of space. Their belief that the Sun is made of acorns reflects their uniquely acorn-focused worldview, a reference to the tendency of real-life squirrels to gather and store acorns as winter food, as well as their single-minded dedication to overcoming obstacles (even elaborately-constructed obstacle courses) for the sake of obtaining nuts.

The title text reveals that "halfway to the Sun," 75 million kilometers from all known acorns in our universe, the airborne squirrel seems to jeopardize the entire mission because he wants to test if the balloon itself is full of acorns. Basic observational skills will tell anyone that acorns are not lighter than air,[citation needed] but the idea follows the logic stated by the squirrels: If the Sun, being so magnificent, must be full of acorns, then a balloon powerful enough to take a squirrel to the Sun must also be powered by something amazing, like acorns. Obviously, neither the Sun or balloons are filled with acorns.[citation needed] That we know of..... Maybe those squirrels were onto something.

Usage of balloons for space travel is a prominent motif in early science fiction; see, for example, "The Unparalleled Adventure of One Hans Pfaall" by Edgar Allan Poe.

#1504: Opportunity

March 27, 2015

Panel 1 — 2010:
AFTER SIX YEARS, *SPIRIT* IS DOWN, BUT *OPPORTUNITY* IS STILL GOING STRONG.
TOUGH LITTLE ROVER!

Panel 2 — 2015:
ELEVEN YEARS, WOW.
WASN'T THE ORIGINAL MISSION 90 DAYS?
THIS IS STARTING TO GET WEIRD.

Panel 3 — 2023:
THE BATTERY IS TOTALLY DISCONNECTED. HOW CAN IT STILL BE MOVING??
GIVEN WHAT IT DID TO THE MARS 2020 ROVER, WE MAY NEVER KNOW.

Panel 4 — 2450, TERRAFORMED MARS, MARTIAN IMPERIAL CAPITAL:
EVERYTHING THE LIGHT TOUCHES IS OUR KINGDOM.
WHAT'S THAT DARK AREA?
THAT IS *OPPORTUNITY'S* HALF OF THE PLANET. WE MUST NEVER GO THERE.

We all remember those famous first words spoken by an astronaut on the surface of Mars: "That's one small step fo- HOLY SHIT LOOK OUT IT'S GOT SOME KIND OF DRILL! Get back to the ... [unintelligible] ... [signal lost]"

Explanation

This comic is talking about the robotic science platform Opportunity. On January 25, 2004, two rovers, named Spirit and Opportunity were landed on the surface of Mars for the purpose of gathering data about the surface of Mars. The original plan called for these rovers to function and collect data for 90 days on the surface.

Both rovers proved to be remarkably robust, with Spirit functioning for 6 years, 24 times longer than the original mission plan, before it became stuck in a sandstorm, which covered its solar panels. This was covered in 695: Spirit, in which the Spirit rover is also portrayed with an anthropomorphic personality.

Even after Spirit ceased to function, Opportunity continued to operate. As of the publication of this strip, it had been operating for over 11 years. This comic extrapolates the rover's resilience to absurdity for comedic effect, implying that the rover begins to operate independently, even with its original power sources disconnected, and presumably developing some form of general intelligence. It then takes a darker turn, implying that Opportunity attacks both later rovers and even human astronauts that later land on Mars. The final panel suggests that humans eventually manage to terraform Mars, but that Opportunity grows so powerful that humanity cedes half the planet to it.

In real life, as of Feb 12th, 2019, the Opportunity rover

has finally been declared dead after 5352 Sols (Mars Days) or 5500 Earth days on Mars. Randall gave a eulogy to the Opportunity rover the day after in its eponymous comic.

In 2023, the comic's timeline version of Opportunity is said to be still moving despite having supposedly no power source. It also started to show aggression in the span of 8 years and deactivated the Perseverance rover, as sent in 2020. Cueball and Megan can't explain how it moves, but investigating is now too dangerous. This evolution is similar to the stories of HAL 9000 (from 2001: A Space Odyssey) and V'Ger (from Star Trek: The Motion Picture), both of which became dangerous to human beings. This, luckily, never ended up happening, as Opportunity "officially" stopped working on June 10, 2018.

"Everything the light touches" is a reference to a line by Mufasa in The Lion King. Mufasa's son Simba then asks "What about that shadowy place?" and Mufasa tells him "That is beyond our borders. You must never go there". This was used again in 1608: Hoverboard, where Cueball tells the same line to Ponytail in the left part of the world. In the what if? article Sunset on the British Empire, concerning the end of the sun shining on the British Empire, Cueball tells a child that everything the light touches is their kingdom, and the child asks (in the title text) "What about that shadowy place over there?" to which Cueball replies (also in the title text), "That's France. We'll get it one of these days."

The title text forecasts the first words of the first astronauts on the surface of Mars. At first, the astronaut copies the first words of Neil Armstrong on the Moon ("That's one small step for [a] man, one giant leap for mankind") but it is interrupted by the Opportunity rover. Opportunity has a drill to collect Martian rock samples, but here it is heavily suggested that the drill is being used as a weapon against the astronaut.

#1505: Ontological Argument

March 30, 2015

...BUT WOULDN'T A GOD WHO COULD FIND A FLAW IN THE ONTOLOGICAL ARGUMENT BE EVEN *GREATER?*
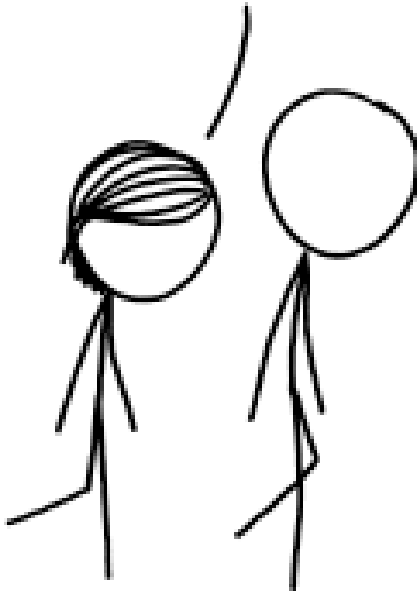
A God who holds the world record for eating the most skateboards is greater than a God who does not hold that record.

Explanation

Ontology is the study of being, reality, and existence. "The ontological argument" is an attempt at proving the existence of God through reasoning about the nature of "being".

Megan's statement in the comic is likely a reference to what is considered the first ontological argument, that of 11th Century philosopher St. Anselm of Canterbury. His argument starts by defining God as "that than which nothing greater can be conceived". Another step in the argument is that you can conceive of such a being even if you don't believe it exists. Yet another step is the statement that a being, of which one can conceive, and which exists, is certainly greater than a being of which one can conceive and which does not exist. Implicit in the argument are two essential premises, both of which are controversial. These are a) that the existence of such a being is possible, and b) that existence is a great-making quality.

The comic makes fun of Anselm's ontological argument by extending to absurdity the claim that a being who exists is greater than one who does not exist, and that therefore God must exist. A God who can disprove the ontological argument must be greater than one who cannot disprove the ontological argument, therefore the ontological argument proves the existence of a God that disproves it. This argument, though a joke, carries some weight. If Anselm's argument is sound, then disproving it

is impossible, and God cannot do it. But if doing things is a great-making quality (a common assumption), then surely doing impossible things would be an even stronger great-making quality. Therefore the argument is able to be disproven, albeit only by God, which contradicts the initial premise that the argument is sound. Therefore, either doing things is not great-making, or the entire ontological argument is invalid reasoning.

The comic also may be drawing an analogy to the omnipotence paradox, as it also refers to the idea that God's power would be greater if He could do the logically impossible. If Randall believes that Anselm's ontological argument is logically sound and based on true premises, then he should think it is impossible to disprove. Therefore, he references the omnipotence paradox by requiring that God do such an impossible thing in order to have maximally great power.

A popular parody of the ontological argument is that of Richard Dawkins, in his best-selling book "The God Delusion". His parody is a version of the argument which attempts to prove that God does not exist. It is similar in approach to this comic and to the omnipotence paradox, in that it also requires a God that can do the logically impossible. In Dawkins' version—borrowed from the Australian philosopher Douglas Gasking—God's greatness is demonstrated by his creation of the world. A being that somehow overcomes the great handicap of not existing and goes on to create the world would certainly be greater than a being that exists and creates the world. Therefore God,

who by definition is "that than which nothing greater can be conceived", must not exist.

Another, rather more famous parody, but which is entirely unrelated to the comic in approach, is that of Gaunilo of Marmoutiers, in which he argues for the existence of a maximally great island. This parody, added to the comic, seems to tell us what happened to the legendary Atlantis. It is worth noting that Anselm himself rebutted Gaunilo's argument, claiming that it was based on a fundamental misunderstanding of Anselm's original argument.

Not all ontological arguments for the existence of God rely on the notion that a God that exists is greater than one that does not exist. Examples include the modal ontological argument from Alvin Plantinga, and Gödel's ontological proof. Graham Oppy, an authority on ontological arguments, attempts to classify here what exactly makes arguments ontological; he concludes that it is that they are a priori in nature. He also classifies them into eight categories: definitional, conceptual, modal, Meinongian, experiential, mereological, higher order, and Hegelian.

This comic, in particular in the way Megan and Cueball are walking and in its reference to theology, greatly resembles the earlier comic 1315: Questions for God.

The title text carries the absurdity a step further by stating that a God holding the record for eating the most skateboards is better than a God without it, continuing

the logic in the comic.

Explanation

1350: Lorenz from Tuesday April 1st 2014. The next was 1663: Garden scheduled for release Friday April 1st 2016, but in the end released on Monday April 4th 2016.

In this interactive April Fools' Day comic Cueball, presumably representing Randall, admits to the readers he built a flimsy cloud services company using spare computers and parts. Included in the cloud hardware are (from left to right) a Macintosh, several old laptops, an Alienware tower, a Nintendo Virtual Boy, an old desktop with the cover off, and an Atari Pong Console. He named the company after xkcd, xkcloud being a portmanteau of "xkcd" and "cloud", here pronounced XK-cloud. The portmanteau incidentally still contains all four xkcd letters in the correct order: xkcLOUd. This was later reused for the xkcd keyboard in 2150: XKeyboarCD, where the word Keyboard, has an X before the word and a C before the D with the xkcd letters capitalized.

After providing his services to various (very big) companies (Facebook, Twitter and Tumblr), that are very concerned with securing the users data, his setup failed (some portions may even have caught fire? He is not sure). This has caused him to lose the data he was required to preserve as part of his service. He thus requests the readers help to make up and re-imagine the lost data by pressing the large red button at the bottom of the comic. Preferably before Facebook & Co notice

we lost it.

If you take him up on his request and push the button, you will be taken to a "survey" where you will get the chance to help by either trying to combine a posted picture with its lost text or, vice versa, by trying to combine a posted text with its lost picture. In either case you get a selection of texts/pictures to choose from but can also choose to write your own text or even draw the picture. After doing this you get to see this combination in the news feed together with several other posts (which other people have helped combine from other lost data). And then you can continue helping as long as you like.

The content of the "surveys" appear to come from reader submissions, and are different upon every click. This is thus both an interactive and a dynamic comic with only the first picture shown on top of this page. By inviting the xkcd readers to add content that will be displayed in the comic later, the result of all the interactions leads to the generation of crowd-sourced content.

It was not immediately clear if the reader-created drawings or captions are, in fact, being cycled into the surveys and feeds, or if the displayed items were all created by Randall and the reader-created content is simply discarded. With the huge amount of different comments and drawings that already appeared on the first day, and since especially the drawings look like they are created in the simple Paint app (i.e. not by Randall), there can be no doubt that most of the content is created by the users. However he must have made some pictures

to get it all started, and at least one of these can be seen here.

This comic resembles last years April Fools' comic 1350: Lorenz where user input also generated a very complex crowd-sourced comic. In both comics it was possible to create a permalink to save a given version of the comic to share with others. An earlier comic was also related to problems with cloud computing: 908: The Cloud.

Due to the very complex nature of this comic, there are lots of details that may need an explanation. This can be found in the sections below. Note that there have been some changes and bugs regarding this comic after it was first released. Some of the pictures that are referenced below were saved before these changes took place. So consult these changes if the pictures do not match the expectations.

Extra xkcloud pages[edit]

Since this comic is so big and complicated, extra pages have been created to include much more information than is wished for on this main page (which is already of considerable size). These pages are listed here for convenience, but they are also listed in the relevant sections below:

- 1506: xkcloud/Pictures of other pages - Pictures representing the other three main types of pages.
- 1506: xkcloud/Pictures posted by users - Some of the pictures of the comic created by users.
- 1506: xkcloud/Transcript - A transcript of these pages with

explanations for the reason for data loss and other features, such as usernames, like buttons, etc.

Functionality[edit]

- Pressing the red button at the front page (shown here above) links to one of two interactive survey pages (see the pictures of all types of pages.).

All these pages have a news feed below the top post. This will be described here below.

- The Lost picture page (see several pictures here) asks the reader to indicate which of eight line-drawings (see several examples here) best matches a given caption, or the reader can create their own drawing.

This can be done on the Draw one your self sub-page (see several pictures here) in a simple web-based "paint"-style app.

Note that someone found a way to copy a picture into the comic. See at least one example of this here.

- The Lost text page (see several pictures here) asks the reader to indicate which of eight captions best matches the given drawing, or the reader can create their own caption and submit this instead.

These captions are user generated. See transcribed examples of these post from users here.

- In either case, at the top of the pages, we are given the Reason for the data loss. And there are many different reasons (all by account of Randall).

A list of transcribed reasons (with explanations included) can be

found here.

- After completing the "survey" you go to a new page appears:
- The Help us recover more data page (see several pictures here) has yet another red button like the front page, but on this page it is at the top of the page, saying exactly Help us recover more data.

By pushing this button you go to one of the two "Lost" pages mentioned above.

- It is possible to go back to the front page at any time by clicking the picture of Cueball sitting behind his desk in the same way as he does in the first picture on the front page.

Cueball is always present to the left on all pages after the front page.

But if you go back to the front page like this, then if you again click on the "original" red button to return to help with the recovery, you will always go back to the same page you came from (with the same posts in the news feed and if it is one of the lost data pages also with the same post to fix.)

You can thus only get to a new survey page by finishing the current task (or pressing a permalink as discussed below).

News feed[edit]

- Below the "survey" or the post you just recovered (to begin with), you will be presented with a listing similar to a Facebook news feed, listing six posts of the line-drawings apparently tagged with the captions as paired up by other users survey results.

The posts are made by apparently fictional randomly-named readers (see transcribed examples of names here).

But there are only 20 user pictures. See these (and why it is known that there are only 20) as well as a description of these pictures here.

The posts are accompanied by a button similar to Facebook's "Like button" but here the button is labeled with different words which are all synonyms for want (see transcribed list of words here). So not "to like" but "to want" is the new thing in this version of Facebook.

- After the first time you recovered a post, there will thus be seven posts on the Help us recover more data page, six new posts below the one you just helped complete.

The only difference when you click this pages red button (rather than when you start for the first time at the front page) is that there will now be seven posts below the one you need to fix.

These seven posts are the same as those you had on the previous page, including your own at the top.

Permalink[edit]

- Next to each post there is a text Link above the "Want" button above the picture. (This goes for all three types of pages mentioned above.)
- The "Link" is an actual link of the type that is called a "permalink", a portmanteau of "permanent-link".
- If you wish to "save" any given post for future reference (for instance one with your own drawing) you can do so by copying down this link.

Last year's April Fools comic, 1350: Lorenz, was the first time the concept of a permalink was used on xkcd.

The permalink option did not appear in the comic until very late in the afternoon on April 1. The "Link" was thus not present on the pictures refereed above. (See these pictures instead).

• Pressing the "Link" next to any given post takes you to the page of the permalink:

This page will show a version of the Help us recover more data page with the chosen post as the top post.

When you click the permalink it takes you to this "new" page and this page will not show all the posts from the page where you chose it.

Only the post you saved via the "Link" next to it.

All the other post will again just be chosen at random, and these will change again every time you reload this page via the saved permalink.

Even the text on the "want" buttons also continues to change.

The user name and user picture stay the same though.

• As an example of a permalink this is a post saying: We told Iran that atomic energy is unsafe for a picture of a black devil and two Cueballs next to a road.

Originally the user name was Mark Zuckerberg but this has since changed to Destiny1983 next to a user picture of a stick figure with black hair on a skateboard.

See Changes in the comic below for a possible reason.

Also please make a note here, if the user name and picture is no longer the same.

• A huge collection of permalinks with link to the pictures have been amassed here:

Table with permalinks contains all known images and captions at least once. (2179 feed entries, featuring 1481 different pictures and 1935 different captions, as of 2015-04-24)

List of Permalinks contains all known permalinks (25585 links, as of 2015-04-24)

• Since the post from the page where you choose the first permalink is reloaded... Can you then only save one post at a time?

• The answer is "no" - you can save all posts on any given page.

For each "Link" text on a given page, there has already been generated a unique permalink URL.

Thus you can copy any permalink via the "Link", without actually pressing the "Link" to obtain the permalink for a given post.

Furthermore, since this may be the only comic where you can copy the text, you can simple mark the entire page and copy paste it into a document that contains formatting. If you do this then you will have all the text, pictures and most importantly the permalinks for all the posts.

• If you click the Link and go to the permalink page there will be seven posts, six new and the one you just saved.

The behavior of the posts is very strange from here if you press

more permalinks on this first permalink page

Also it will not be the same again after this first time as compared to if you continue to help recover more data and use the permalink later.

On this first permalink page, where your chosen post is at the top, if you click on another post's permalink the following will happen:

The post you originally choose disappears from the page, as the new chosen post is moved to the top.

The other five post remains in the same order, so there are not only 6 posts.

If you continue to choose the other posts one at a time, they will simply exchange place with the one at the top, with all six posts remaining.

Once you have been through all of them, then the order of the post has been determined.

So if you click on a "Link" that you have already once activated, then this page will just reload, and the post will have the same order as last time.

This is only until you choose to reload, or when you load such a permalink later. Then again it will just be the chosen post, and then always six other new posts.

If you then at some point move on via the red button you kind of stay in the permalink page, now just with new options to choose from.

If you then create a new post, six new posts will be loaded below.

When you click on a permalink at this point, there will not be any

reloading of the post (because it is not the first time).

Any post you click will move to the top, but all the other (six this time) will stay, the top post just moving down to another position.

It is not always a direct exchange. Sometimes the top post moves to another position and then pushes the others down until they reach the now calculated position of the post now at the top.

Our policy regarding your personal data[edit]

- Please stop sending us your personal data
- We are running out of places to put it
- Is this even yours?
- Does anyone recognize whose data this is?
- Oh jeez never mind here comes more data
- Why are you doing this
- Please stop
- Help

Don't contact us[edit]

- At the same time the permalink appeared, there was also suddenly a new link on all other pages than the front page, written in a very light grey font. It can be hard to see on some screens and has possibly changed colour to become harder to see since it first appeared.

It is located right beneath help at the bottom of the list of problems written under our policy regarding your data right beneath Cueball at his desk to the left (see picture here).

In some cases, tilting the screen will help to make it visible- if you

still can't see it, you can still find it with the cursor, or you can also highlight the text below Cueball down to make it easier to see.

- The link text reads Don't contact us and links to a now-defunct chatroom formerly hosted at euphoria.io.
- Click the link to open an xkcd chatroom on Euphoria. (See a picture here).

Several xkcd users began posting on the original chatroom at around 18:00 Eastern time (Randall's timezone).

After picking a username, you can chat in real time with the other users. You can change your username by clicking on it near the bottom of the screen and entering a new one.

We are open for anyone to chat here. Hey you! Come right over and say hello to us! ~euphoria.io/room/xkcd https://euphoria.leet.nu/room/xkcd/

(PS. Please say thank you to @Xyzzy on it; He did make the new chat, after all. (From @KurzgesagtDuck11.))

- This chat room is reminiscent of the one in a comic 1305: Undocumented Feature.
- As mentioned above, this chat room is hard to access! You need to know that there is a hidden link on the pages you get to by pressing a red button in xkcd 1506.

You do get to choose your username (this is not the case in Undocumented Feature), but you could change it. Or others could use the same.

- When it came out, many users began using the chatroom.

- Maybe Randall timed these extra features for when people came back from work all over the US.

#1507: Metaball

April 03, 2015
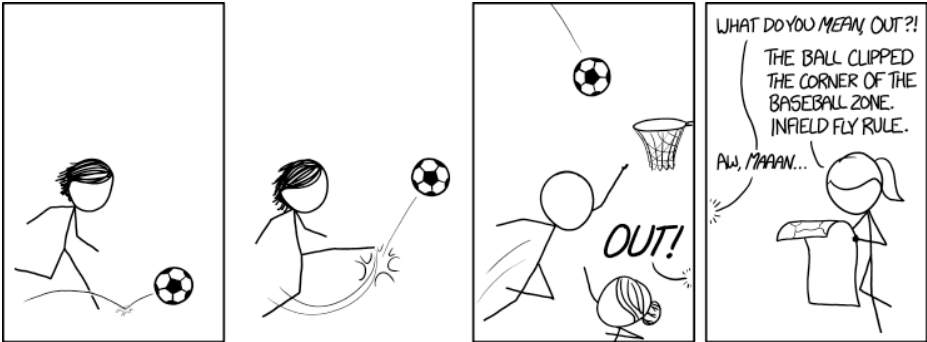
Shoot, it landed in the golf course. Gonna be hard to get it down the--oh, never mind, it rolled onto the ice hazard. Face-off!

Explanation

In the first two panels of this game Megan kicks a football (also known as a soccer ball in some regions), but the surprise comes in the next panel when it turns out she tried to kick it into a basketball hoop where Cueball is either trying to catch, stop or dunk the ball. Hairbun is also reaching an arm up after the ball. But then Ponytail yells "Out!". When Megan asks Ponytail why the ball is out, Ponytail explains it is due to the infield fly rule that was invoked when the ball crossed into the baseball zone - a very complicated rule to understand for baseball outsiders.

They are playing a ball game that incorporates the rules of many games that use a ball. The rules seem to be based on the location of the ball. Ponytail is holding a map which divides the area into zones. Each time the ball enters a new zone, the rules change to become the rules of the ball game represented in that zone.

The name "Metaball" is the combination of the prefix "meta" and the word "ball". Not long before this comic there was another comic with "meta" in the title: 1447: Meta-Analysis. The entire joke is meta in 917: Hofstadter.

Megan is out according to the rules of baseball, because the football that she initially kicked in the football zone in an attempt to score in the basketball hoop (in the basketball zone), clipped the corner of the baseball zone.

And suddenly her high kick turned into a pop fly and Ponytail (presumably the referee (and creator/ruler) of this game) invoked the infield fly rule which forces the batter out. In this case that would be the kicker Megan as she is the last to have touched the ball.

In baseball the infield fly rule can be invoked by the umpire (i.e. the referee in baseball, Ponytail in this case), to prevent an infielder from intentionally dropping a fair ball when runners are on multiple bases, forcing the runners on base to advance and allowing the infielder's team to quickly perform a double or triple play by throwing the ball to where the runners are trying to get and performing force out on their base. The infield fly rule, once called out by the umpire, forces the batter to be out whether or not the infielder tries to get the batter out. While complicated, and difficult for outsider to understand, the rule has been in baseball for a long time and makes sense in context.

The title text continues the comic. After Megan is ruled out, even though Cueball misses the catch, the ball now enters the golf section of the field, meaning that the players would have to hit the ball into a golf hole to score. Given that the ball is much larger than a standard golf ball, this would prove difficult. However, before they get this far, the situation changes as the ball rolls into a separate section of the field called the ice hazard.

On a golf course a hazard is either a bunker (with sand) or a water hazard. If the latter type freezes over it could be called an ice hazard. However, in this Metaball game

this section of the course is apparently used to play some form of ice hockey. And since the game has been held up when Megan was called out, they will now have to restart the game with a face-off (a skirmish between two players of opposing teams to restart the game). It can be argued that an ice hockey puck can be considered a ball, since ice hockey has evolved from, and is a variation of, older stick-and-ball games. And since they play both baseball, basketball and golf with the association football, they could also continue playing ice hockey with this ball instead of a puck.

For the record there are several other versions of hockey that are played with a ball (ball hockey for instance) and at least one of these is played on ice (see broomball). In these games face-offs are also used. It seems likely that Randall has chosen some of the most popular sports of the US - and then used a soccer/football instead of an American football.

Given the timing of this comic with the US collegiate basketball tournament, we may assume Randall is writing as a response to that. He has previously given an opinion on sports (see for instance 904: Sports, 1107: Sports Cheat Sheet and 1480: Super Bowl).

This concept is very similar to Calvinball from the comic strip Calvin and Hobbes by American cartoonist Bill Watterson.

In computer graphics, metaballs, also known as blobby objects, are organic-looking n-dimensional isosurfaces,

characterised by their ability to meld together when in close proximity to create single, contiguous objects.

#1508: Operating Systems

April 06, 2015
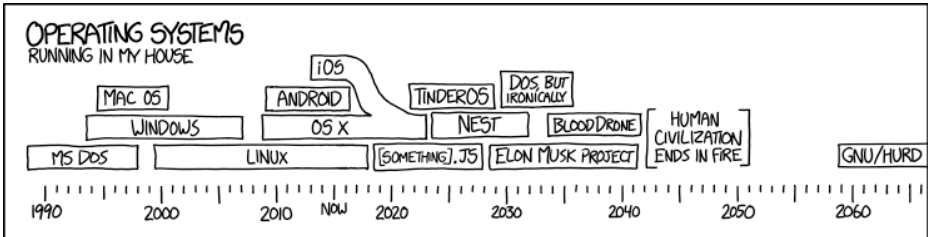
One of the survivors, poking around in the ruins with the point of a spear, uncovers a singed photo of Richard Stallman. They stare in silence. "This," one of them finally says, "This is a man who **BELIEVED** in something."

Explanation

In this comic, Randall gives an overview of the past, present and (speculatively) future of the operating systems running in his house at any given time. Notably, because Randall is fascinated by technology, he has had more than one OS running in his household since the mid '90's. The timeline tracks how Operating Systems have come and gone over the years, and the gradual shift from desktop Operating Systems to mobile can be observed. Beyond the present day, we see some of Randall's humorous predictions as to which technologies and companies will dominate the Operating System landscape in the future.

It may be that the OS that is closest to the time-line is also the one he mainly uses during these extended periods. Previous and current systems:

- MS-DOS (Microsoft Disk Operating System): The default, command-line-based OS on most IBM PC-compatible computers. Early versions of Microsoft Windows operated as shells on top of MS-DOS rather than stand-alone OSes in their own right, which may explain part of the overlap in those two bars.
- Apple's Mac OS (Macintosh Operating System): The OS of Apple's Macintosh line of computers. Randall's bar indicates that he stopped using Macs in 2001, after Mac OS had been superseded by the new and then-buggy Mac OS X.

- Windows

- Linux: A free software Unix-like kernel often used with the GNU system to produce GNU/Linux (commonly but erroneously referred to as simply Linux). Randall's bar indicates that he likely used it on one or two PCs starting from 1999 while still using Windows on other PCs, or perhaps was dual-booting one or more PCs with Windows, until abandoning Windows in 2007 to use (GNU/)Linux full-time. This timing coincides with the release of Microsoft's controversial Windows Vista and the advent of more user-friendly Linux distributions.

- OS X (Macintosh Operating System v10): The successor OS of Apple's Macintosh line of computers. Although it was sometimes marketed as merely the 10th version of the earlier Mac OS, it was largely a new product. The bar indicates Randall's renewed use of Macintosh computers in 2009 after the OS had matured and Macs had transitioned to Intel processors.

- Android: The upper layers of the OS running on Android phones and tablets, above the Linux kernel. Randall is indicating that he has at least one of these devices.

- Apple's iOS: The OS of iPhone, iPad, iPod Touch and the basis of the OS run by the Apple TV and Apple Watch. Randall is indicating that he also has at least one of these devices.

His predictions for the future include:

- 2018: That OS X (now called macOS) and iOS will merge. There is frequent speculation on technology blogs as to whether or not this merging will come to pass in the future. The two OSes have a common origin, share a lot of software, and are maintained by the same company that would benefit from the efficiency of maintaining a single unified OS. Opposing this is the fact that interaction patterns are very different between traditional computers and tablets/phones and a one-size-fits-both solution may not be feasible (as proven by Microsoft's disastrous attempt at such), and the fact that Apple spends some time in each of its recent keynotes mocking computers like the Microsoft Surface Pro which use both standard computer and touch control. However, just two months after this comic was posted, Apple asserted that they would not merge the two. (That being said, Macs are getting closer to iOS devices now that they use the same type of processor, as well as copying some of the software design and features of iOS.)

- 2019: That an operating system designed with and for JavaScript will become attractive, perhaps along the lines of NodeOS and/or Runtime.js.

- 2022: That there'll be an OS based on the Tinder dating app.

- 2024: That there'll be an OS from Nest Labs, presumably oriented towards home automation and the Internet of things.

- 2029: That Elon Musk will come up with an operating system.

- 2030: That DOS would make a comeback, but only in an ironic fashion (maybe because there would be no more disks left for it to operate from).

- 2034: That Randall will be deploying an autonomous drug-delivery drone in his body.

- 2042: Human civilization comes to a fiery end, maybe due to some unholy combination of the above innovations. Another possible explanation is that human civilization will be wiped out by an artificial super-intelligence, superior to human intelligence, as Elon Musk, Ray Kurzweil, Bill Gates and many tech pundits foresee that 2045 will be the year to see such technology becoming real, and as Elon Musk, Bill Gates and many other tech pundits fear that it will be the extinction of all life on earth, as explained on this page.

- 2059: At this time his operating system will be GNU/Hurd. This infamously and perennially late GNU/Hurd OS will finally make it in to Randall's home after human civilization has been wiped out. The joke is that GNU/Hurd began to be developed in 1990, and while it was expected to be released in a relatively short time, even now only unstable builds have been released. So Randall is saying that he will finally run it in his house a decade or two after the end of civilization. GNU/Hurd will presumably have an advantage as humanity rebuilds civilization due to the widespread availability of its code and development tools, and perhaps also because of Stallman's depth of belief, based on the title text. Alternatively, GNU/Hurd might be finished by the same force that

finished humankind, for instance Skynet, in case of AI Apocalypse. (Interestingly, although still far from completion, a new version of GNU/Hurd was released less than a week after this comic.)

The title text refers to Richard Stallman, the founder of the Free Software movement and the GNU and Hurd projects. A survivor of the fire that ended the human civilization has uncovered a slightly burned (singed) picture of him. Those gathered can see, either directly from the picture or because they already know of Stallman, that this was a man that really believed in something. In this case it was free software. Inspired by his image, they rebuild their lost civilization and finish Hurd development. The GNU/Hurd reference might also be a pun, as in a "herd" of Gnus "running" in his living room, as wild animals reclaim the Earth after the end of human civilization.

GNU is a collection of free software utilities, particularly the system utilities used with the Linux Kernel to form the GNU/Linux operating system (often erroneously called just Linux). Hurd is an operating system kernel designed as part of GNU project that could be used in place of the Linux kernel to produce a complete GNU operating system. Hurd has a microkernel architecture, which has many perceived advantages over Linux's monolithic kernel, and is thought by many to be technically superior, despite its low adoption rate compared to the Linux kernel. As of 2023, it is still in development as version 0.9. Randall has made several comics about free software and also about Stallman.

#1509: Scenery Cheat Sheet

April 08, 2015

A CHEAT SHEET FOR FIGURING OUT WHERE IN THE US YOU ARE BY RECOGNIZING THE BACKGROUND FROM MOVIES (FOR USE BY GEOGUESSR PLAYERS AND CRASH-LANDED ASTRONAUTS)
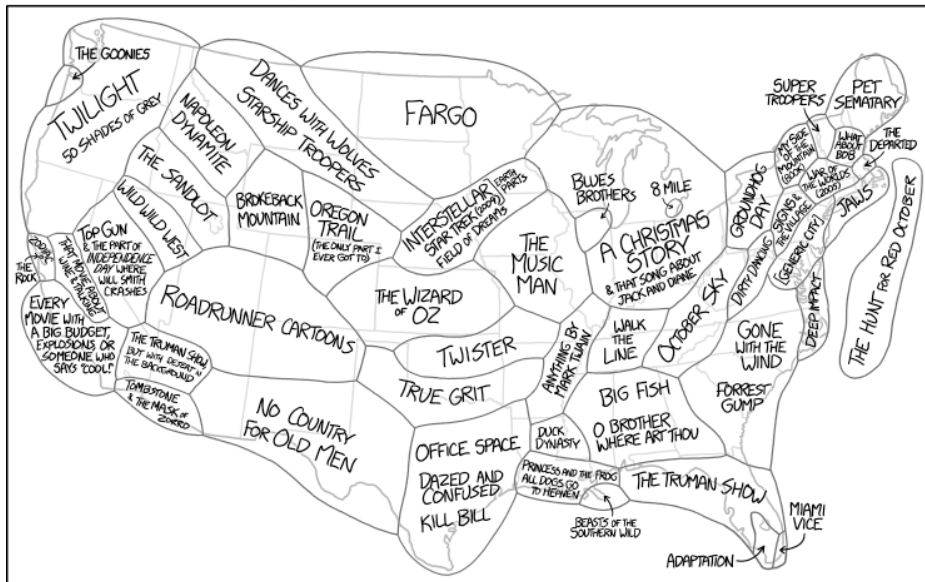
At the boundary between each zone, stories blend together. Somewhere in the New Mexico desert, the Roadrunner is pursued by a tireless Anton Chigurh.

Explanation

In this comic Randall jokes that large areas of the continental (mainland) United States can be characterized by the locations of a single movie. Especially in the Midwest, there are several very large areas that he describes with just one film. The map is the most detailed in the northeast, which is where Randall lives.

The map is divided into the 48 states of the mainland by thin gray lines. On top of these are drawn black lines that divide the map into 50 sections. (A 51st section is located in the Atlantic Ocean.) Inside each section is at least one reference that is supposed to describe the entire area encompassed by the section. In most cases it is the title of a movie (or two to three titles), but it could also be more general specter of movies (all movies with a big budget, or those with whose title is an east coast city name) or it could even be a book/song that describes the relevant area.

The map's heading describes the idea behind it; if you know this and the relevant movies, you can use it to determine where you are by comparing your knowledge of the movies with the scenery you can see from where you stand. Below the heading, the two groups of people who will get the most use out of this sheet are listed. The first is "GeoGuessrs". GeoGuessr is a game using Google Street View images, which drops the player in a random location and challenges them to work out where they are.

(It was previously referenced in 1214: Geoguessr). The second group is "crash-landed astronauts". Obviously, if you've just crash-landed on Earth, knowing your location would be very helpful. That said, this map only helps if you land in the contiguous United States, which is not very likely overall.

Some entries (for instance, Groundhog Day) reflect the locations where the stories are set, and others (like Dances with Wolves) reflect where they were filmed. Others are even more detached, as it is the sceneries from the movie that resembles a given place, even though it is neither filmed there or takes place there. It could also be a cartoon, which is of course only set in an imaginary world that may resemble the real world.

The title text references Anton Chigurh (portrayed by Javier Bardem), who is the main antagonist of the film No Country For Old Men. In this case he would have taken over the role of Wile E. Coyote, and would thus hunt down The Road Runner at the boundary between the sections for these two movies, which would be somewhere in the New Mexico desert.

#1510: Napoleon

April 10, 2015

"Mr. President, what if the unthinkable happens? What if the launch goes wrong, and Napoleon is not stranded on the Moon?" "Have Safire write up a speech."

Explanation

Napoleon Bonaparte was one of the greatest military leaders in history, conquering most of Europe in the space of a decade. In 1814, after being forced to abdicate as Emperor of the French, he was exiled to the island of Elba. However, in February 1815 Napoleon escaped back to France, quickly raised an army, and overthrew the Bourbon Restoration monarchy for a period known as The Hundred Days. At the end of this period (actually lasting 111 days), Napoleon was defeated by British and Prussian forces at the Battle of Waterloo, and surrendered a month later. This time he was exiled to Saint Helena, an island much more remote than Elba—in fact, one of the most remote places on Earth.

In reality, Napoleon made no serious attempts to escape Saint Helena, although Admiral Thomas Cochrane reports in his memoirs that while on his way to lead the fledgling Chilean Navy in their revolution against Spain he intended to stop at St. Helena in order to free Napoleon and put him in charge of all the South American rebel armies. In the event, before he arrived at the island he learned that Napoleon had died there, six years after his surrender. However, this comic imagines a world in which Napoleon escaped once again, swimming back to Europe. Saint Helena is 2,000 km (1,200 mi.) from the Afro-Eurasian landmass, making such a swim rather implausible, especially considering the ball and chain around his ankle. And Napoleon is depicted fresh out of the water, suggesting that he did not simply swim

to Africa and make his way back to Europe, but rather swam straight to Europe, a journey of roughly 6,100 km (3,800 mi.).

The comic implies that Napoleon proves impossible to confine, despite escalating attempts to send him to more remote locations and apply increasingly confining restraints (handcuffs, then adding a ball and chain on one ankle, then chaining the ball to both ankles). In addition to being able to swim impossible distances, he seems to also somehow escape imprisonment in the ice of Antarctica. He also seems to be immortal (or well-preserved by the ice of Antarctica), remaining alive and apparently in great physical condition while nearly 200 years old. The final panel shows U.S. President John F. Kennedy's "We choose to go to the Moon" speech, but implies an alternate ending to the line "not because it is easy, but because it is hard.". Rather, it appears that we choose to go to the Moon not because it is easy, but because it will be hard for Napoleon to return. In the title text of 1291: Shoot for the Moon, the idea of missing the Moon and ending up orbiting the Sun is the subject.

The title text is an apparent conversation between President Richard Nixon and an aide. Nixon is asked what we will do if we fail to maroon Napoleon on the Moon, and replies "Have Safire write up a speech." This is a reference to Nixon speechwriter William Safire, who wrote the draft speech "In Event of Moon Disaster", to have been delivered by Nixon should the Apollo 11 astronauts be stranded on the Moon. This comic thus

proposes an inversion of the actual scenario—instead of Nixon delivering Safire's speech because someone's been stranded on the moon, in this comic he'd be delivering it if someone weren't stranded on the moon. "In Event of Moon Disaster" was also the topic of 1484: Apollo Speeches, published two months before this comic.

The speech could be something like this:

"Good evening, my fellow Americans. Fate has ordained that the man who was sent to the moon to keep the peace will not stay on the moon to rest in peace. This man, Napoleon Bonaparte, knows that there is now hope for his recovery, but there is no hope for mankind in his return..."

#1511: Spice Girl

April 13, 2015
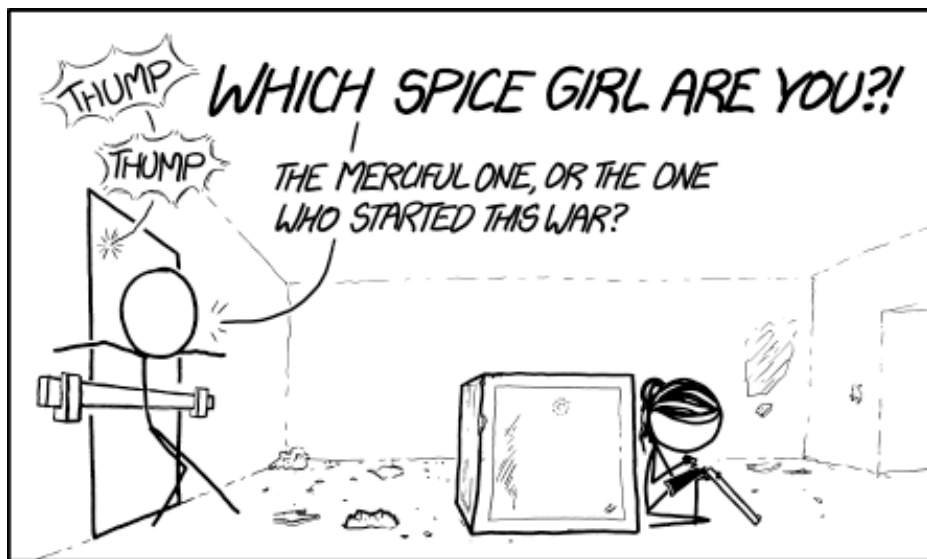
WHEN I SEE THOSE QUIZ TITLES, I LIKE TO IMAGINE THEY'RE BEING SHOUTED THROUGH A DOOR IN A POSTAPOCALYPTIC DYSTOPIA.

Haha, you'll see!

Explanation

The Spice Girls[edit]

The Spice Girls are a British pop girl group formed in 1994. It consists of five girls who each have a "spice girl" nickname. The five girls with their respective nicknames are:

• Mel B (MB) or "Scary Spice"

• Mel C (MC) or "Sporty Spice"

• Emma Bunton (Em) or "Baby Spice"

• Geri Halliwell (G) or "Ginger Spice"

• Victoria Beckham (V) or "Posh Spice"

Not too much later, in 1554: Spice Girls, he shows how difficult it is to remember these five names.

The internet quiz[edit]

This is one example of a trend of online quizzes that would "identify" the user with one person/personality of a group based on a series of personality questions. This will most often concern which member of a band, TV cast/film cast or character from books, etc. the quiz taker most resembles. In this comic it is specifically Spice girl quizzes that are the subject. In this comic, Randall is suggesting that in order to cope with what he probably considers to be irritating clickbait links to these quizzes, he imagines the link titles as being shouted through a door in a postapocalyptic dystopia. This is a reference to a trope in movies set in such postapocalyptic settings (which Randall presumably enjoys more) in which the heroes must determine whether an

unknown agent is friend or foe, which in some such media occurs by shouting through locked doors. It is not likely that Randall would actually complete these quizzes, but if he did in this fantasy setting, the stakes would be higher, and each answer would be fraught with dangerous meaning. It would thus also be much more fun taking the quiz and the result would seem to be important.

In Randall's fantasy dystopian future, the character who is subject of the dialogue may be one of two Spice Girls, described alternately as the one who is merciful and the one started the war (which likely resulted in the said dystopia). It is possible there are only two remaining Spice Girls, or that there are simply only two likely options in the particular circumstances of the comic. It is also unclear if Randall may be suggesting two fictional Spice Girls, or if in his fantasy future, two of the actual original Spice Girls fit the criteria mentioned. The Merciful One could be a reference to the song with the same name by Zohar, another British music ensemble.

As a result of the way a speech line was drawn in this comic, there was initially ambiguity as to the source of the dialogue. The official transcript now states: "Terrified figure: WHICH SPICE GIRL ARE YOU?! The merciful one, or the one who started this war?". Cueball has been described as the "terrified figure", making it clear that it is indeed Cueball who shouts the line, and not the "cruel interloper" who pounds at the door. Randall often uses the four little lines at the source end of the speech line to denote sound coming from an unseen source. The quiz question is being shouted by an angry agent or crowd outside the door, presumably in reference to the female character seen in the comic. Presumably if she is "the one who started this war", the person(s) outside

would be hostile toward her.

In this case, it looks like the female character (who otherwise appears to be a Hairbun character) does not have any intention of answering, and is preparing for when the people outside break down the door by loading her shotgun to defend herself. In this interpretation, the title text is said by "Hairbun" Spice indicating that when they get through the door they will be in trouble.

Here are a few examples of "Which spice girl are you?" quizzes:

• Buzzfeed
• Zimbio
• Brainfall
• GoToQuiz

The title text[edit]

The title text refers to the lyrics from the Spice Girls' debut single, Wannabe (Listen to Wannabe on YouTube) Here below is the relevant excerpt from the song where the letters in the last four lines refer to the spice girls as given above. This rap bridge is sung by Scary Spice except for the line with Easy V which is sung by Ginger Spice:

These lyrics function as a little introduction to the (then) less-well-known girl group. The final line takes on a threat-like tone in this new context of the comic. And it doesn't help that it is Scary Spice who sings it.

The text may seem a little confusing to understand, especially the line that finishes on an. According to another lyrics-site, which also has explanations to some parts of the text, it means that G

and MC likes it (sex) together with ecstasy - as "On an E" is slang for being on ecstasy (see it used in this discussion). They could not sing this directly without resulting in a PG rating, thus they inserted the "E" in the next line as Easy V, a line which is even sung by another Spice Girl, Ginger Spice, where the rest of this bridge is sung by Scary Spice.

#1512: Horoscopes

April 15, 2015

HOROSCOPES
WITH AN ACTUAL BASIS IN FACT

ARIES • YOU MAY HAVE BEEN CONCEIVED AFTER A 4TH OF JULY FIREWORKS SHOW

TAURUS • YOU MAY HAVE BEEN CONCEIVED ON A HOT AUGUST DAY

GEMINI • YOU MAY HAVE BEEN CONCEIVED AS THE LEAVES BEGAN TO CHANGE

CANCER • YOU MAY HAVE BEEN CONCEIVED BY PEOPLE TRYING ON COSTUMES

LEO • YOU MAY HAVE BEEN CONCEIVED DURING THANKSGIVING

VIRGO • YOU MAY HAVE BEEN CONCEIVED WHILE A CHRISTMAS SONG PLAYED

LIBRA • YOU MAY HAVE BEEN CONCEIVED AFTER A NEW YEAR'S EVE PARTY

SCORPIO • YOU MAY HAVE BEEN CONCEIVED BY PEOPLE STUCK INSIDE AFTER A LONG WINTER

SAGITTARIUS • YOU MAY HAVE BEEN CONCEIVED DURING MARCH MADNESS

CAPRICORN • YOU MAY HAVE BEEN CONCEIVED DURING A SEXY EASTER EGG HUNT

AQUARIUS • YOU MAY HAVE BEEN CONCEIVED ON MOTHER'S DAY

PISCES • YOU MAY HAVE BEEN CONCEIVED AT SOMEONE'S WEDDING

If you live in the Northern hemisphere, anyway. In the southern hemisphere, due to the coriolis effect, babies are born nine months BEFORE they're conceived.

Explanation

Horoscopes purport to predict someone's personality or future, based on the position of planets and stars at the time of their birth and at present. Horoscopes commonly group people into twelve groups based on zodiac signs. The names of the horoscope Zodiac signs are based on the names of twelve constellations that were the backdrop for the path of the sun in the ancient times when the rules of settings horoscopes were originally developed. Today, due to precession of the Earth's axis of rotation (and to a lesser degree due to the modern formal definitions of constellations), the Zodiac signs do not correspond fully to the names of actual constellations in the path of the Sun. One's zodiac sign is determined by the position of the sun on their birthday, with each sign representing a specific 30.4 day period (1/12th of a year), starting from the First point of Aries.

Modern science has found no basis for horoscopes. As with many unscientific claims and mythologies, Randall doesn't seem to care for the beliefs, and has more fun gently mocking them. The joke of this strip is that the only thing you can calculate from your astrological sign is the period of the year during which you were conceived. The average human is born 38 weeks after conception. There's enough variation in the length of pregnancies that this can vary by as much as several months, but for the majority of people, the date of their conception can be calculated from their birthday, within a week or two.

This can be a slightly uncomfortable topic, because most humans were conceived by their parents having sexual intercourse, which is a topic that many people find uncomfortable to think about. The premise of this strip is that, based on the time you were born, you can make a guess at the circumstances under which you were conceived. Such guesses wouldn't be universally accurate, of course, but the notion that you could make a decent guess of the circumstances of someone's conception feels almost transgressive.

Randall phrases his "predictions" as possibilities ("you may have") rather than declarations, acknowledging that it is a guess, and that it, unlike actual horoscopes, doesn't necessarily apply to everyone.

The title text mentions that these predictions only apply to the northern hemisphere. This references both an issue with zodiac signs (as constellations are different in the southern hemisphere), and the fact that his 'predictions' are clearly based on an American context (many of the holiday references are exclusive to America). This idea is then lampooned by attributing it to the Coriolis effect (which has nothing to do with birth dates), and claiming that children in the southern hemisphere are born 9 months before conception (which is obviously impossible).

The Coriolis effect refers to a phenomenon of motion that occurs relative to a rotating reference frame. Since the Earth is rotating, an apparent force (the Coriolis force) causes objects moving toward the poles to be

deflected to right in the northern hemisphere, and to the left in the southern hemisphere. This effect is the reason that weather systems (most clearly seen for hurricanes) which rotate in opposite directions, depending the hemisphere.

#1513: Code Quality

April 17, 2015
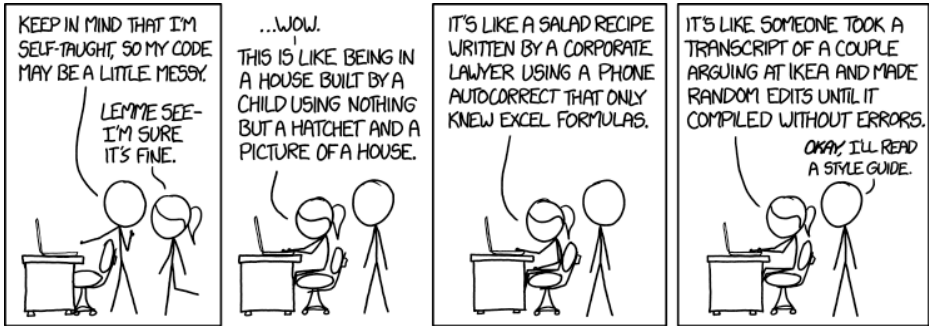
I honestly didn't think you could even USE emoji in variable names. Or that there were so many different crying ones.

Explanation

This comic is the first in the Code Quality series:

- 1513: Code Quality
- 1695: Code Quality 2
- 1833: Code Quality 3
- 1926: Bad Code
- 2138: Wanna See the Code?

Ponytail is about to look at some source code Cueball has written, and he is warning her that he is self-taught so his code probably won't be written the way she is used to. In spite of Ponytail's initial (polite) optimism, she comments in three increasingly harsh similes (and a fourth in the title text).

First, she suggests that reading his code is like being in a house built by a child, using a hatchet (a small axe) to put together what he thought was a house based on a picture. She is saying that the code shows a lack of command of the language being programmed. This is like the common expression "If all you have is a hammer, everything looks like a nail." New programmers make use of the same techniques repeatedly, using them for situations where other techniques would be far more efficient or faster.

Second, she suggests that it looks like a salad recipe, written by a corporate lawyer on a phone with

auto-correct that only corrects things to formulas from Microsoft Excel. She is saying that the code is verbose and the corrections that were done are illogical. This presumably relates to the developer not being an expert in their craft, and fixing the problems as they come up instead of re-examining the problem and solving it in a better way.

Third, she describes it as a transcript of a couple arguing at a branch of the Swedish retail chain IKEA, that was then randomly edited until the computer compiled it with no errors. She is saying that the intent of the code is unclear due to the seemingly random use of the language. This is very similar to an infinite amount of monkeys bashing away on typewriters for an infinite amount of time that will eventually produce the complete works of Shakespeare. (A couple's argument may be even less coherent at IKEA than at the average store, since IKEA products always have idiosyncratic names and many of them are difficult to pronounce or transcribe for anyone who doesn't speak Swedish.) This might happen if the code was written so badly that it does not compile, and people edited the code until it compiles so they can see what the code accomplishes. The fact that Cueball's code is in this bad of a shape indicates he really hasn't learned the programming language; he just happens to have a program that works in some shape or fashion.

Finally, Cueball makes the rather weak assurance that he will read "a style guide", which articulates the intended use of the language. It seems clear from Ponytail's commentary that his code quality would benefit from far

more training in computer programming.

The title text refers to emoji. Ponytail's comment implies that some of Cueball's variables contained emoji, perhaps in an effort to capture the emotional content of the arguments which show through the requirements document. Emoji have become a recurrent theme on xkcd, but this may have been the first comic to use them for a pun.

Emoji[edit]

Many crying-face emoji are possible if variables can include full Unicode (e.g., ,,,,), as well as faces with sweat drops that are often mistaken for tears (,,,). In some programming languages it would be impossible to use them in variable names, as the symbols would break the language's syntax rules. Exceptions to this include Swift and Perl (), but most languages with compilers that support Unicode characters can include this kind of emoji, even for languages that predate Unicode like C++ and Lisp.

In any event, Cueball's code may best be represented by a bunch of people crying, as that seems to be the only proper response to it.[citation needed]

Programming Style[edit]

Although few programming languages require a perfectly rigid style, so long as the code is syntactically accurate, most programmers follow some sort of style to make the code easier to read. This includes indenting lines to show levels and using descriptive variable identifiers with special capitalization, (e.g.,

camelCase, capitalizing each word except for the first in a sentence, or snake_case, separating lowercase words with underscores).

#1514: PermaCal

April 20, 2015

WHAT DAY IS IT?

SUNDAY THE 19TH.

BUT YOU SAID IT WAS THE 19TH YESTERDAY.

IT CHANGED AGAIN? CRAP, BETTER ADD ANOTHER LEAP DAY.
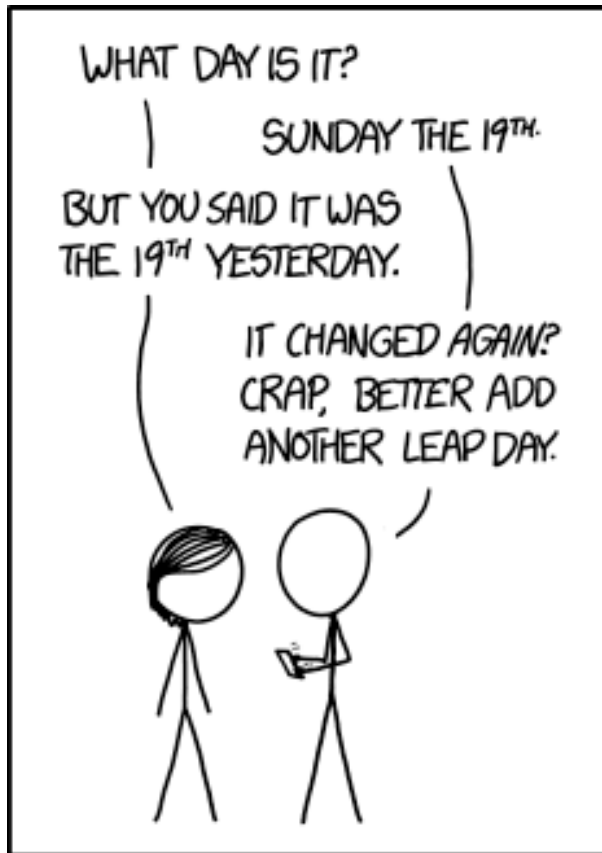
MY NEW SIMPLIFIED CALENDAR SYSTEM ASSUMES THE DATE NEVER CHANGES, THEN CORRECTS ANY DRIFT VIA LEAP DAYS.

The flood of PermaCalNTP leap-second notifications was bad enough, but when people started asking for millisecond resolution, the resulting DDOS brought down the internet.

Explanation

This comic proposes a new calendar system, named PermaCal (a malamanteau of the words "permanent" and "calendar"). In it, the date stays constant. In order to accomplish that, as each day passes, it is interpreted as "drift", and a new PermaCal leap day (analogous to the leap day of the Gregorian calendar) is added to compensate.

In the comic, which was published on Monday April 20, 2015, Megan wonders why today would be the 19th, since Cueball said it was the 19th a day ago. Cueball interprets the news from Megan, that a day has passed, as "drift" in the date, and resolves to add another leap day to PermaCal so that his calendar will be correct. He is presumably becoming frustrated that he has to do this so often.

Leap days in the Gregorian calendar are days added to the end of February every year that is a multiple of 4, but not by 100, unless it's also a multiple of 400. The purpose is to synchronize the calendar with Earth's orbit without having a partial day each year. Leap seconds are necessary because the earth rotation is not constant, but speeds up and slows down over time. The leap seconds account for the differences in the length of our 24 hour day and a solar day (the time taken for Earth to rotate once with respect to the sun), and are announced several months beforehand.

NTP servers are used to keep local computer time from drifting. They also are used to announce Leap seconds. In the context of this comic, leap seconds would refer to a different system in which there is a new leap second each second, so the time also stays constant, down to the resolution of one second. This would require something like setting the NTP leap second bit anew every second. The title text presumably refers to moving to a resolution of one millisecond via leap milliseconds. This would require at least 1000 updates being requested every second, using enormous network bandwidth and resulting in a Distributed Denial-of-service attack (DDoS) situation.

The comic relates to several DDoS problems due to NTP server misuse and abuse over the years.

Part of the humor stems from the problems that leap seconds are causing for some computers. The last leap second disrupted computers at big companies such as Reddit, LinkedIn, Gizmodo and FourSquare. Google first introduced a new approach of smearing the leap second, smoothly changing the reported time over an undisclosed number of hours around midnight UTC on December 31, 2008. The smooth shape of the adjustment is graphed at synchronization - Math behind Google leap second smear formula - Stack Overflow.

A new calendar was also proposed in comic 1061: EST.

#1515: Basketball Earth

April 22, 2015

How many points do you get for dunking every basketball in existence at once?
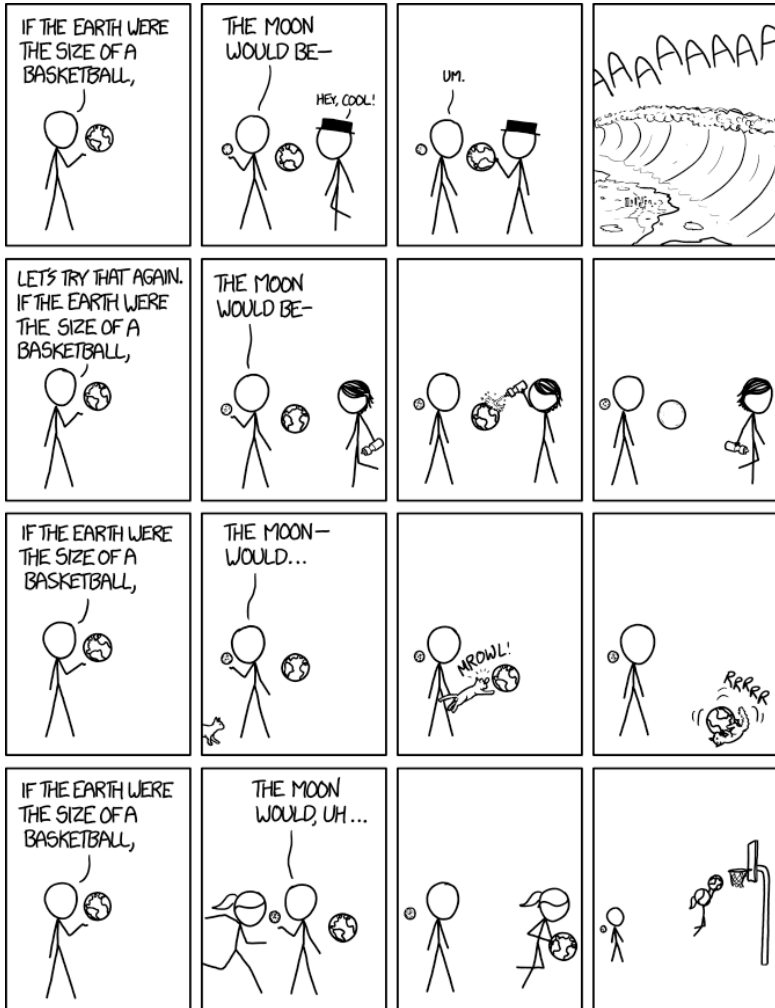
Explanation

In this comic Cueball is repeatedly attempting to make a size comparison between the Earth and the Moon. But he only gets to say If the Earth were the size of a basketball, the Moon would be-. Then he is interrupted again and again. (See the title text of 1074: Moon Landing for the same Earth comparison).

A basketball is about 25 cm in diameter and from this it can be inferred that the Moon should then be less than 7 cm in diameter, a typical size for other smaller balls in different sports. Cueball handily illustrates this with two "balls" of the relevant sizes. At first, you think that they just look like the Earth and the Moon. But they are invisibly suspended, and — as seems clear from the first row of panels — they are actually the real Moon and Earth shrunk to the relevant size, hence the title Basketball Earth.

This would place Cueball and his "friends" in God-like positions, outside Earth. Maybe they are even in a different dimension since they can stand and observe the system.

But before Cueball can finish with this common type of comparison, he is interrupted and must begin all over again. We thus never learn what object he would have compared the Moon with. It seems, likely, however, that he would use another ball for the comparison. And the best ball to use would be a tennis ball. See the same sort

of comparison of Earth/Moon with basketball/tennis ball in this illustrative video that asks the question: How far away is the Moon?. From this, it is also obvious that the system Cueball shows is not to scale with regard to that distance, which should be 7.37 m! This is not necessarily a mistake of the comic, since Cueball never claims that these two balls are in orbit or that they are even the real ones. He is just (in vain) trying to make a size comparison of the two. (Though perhaps further exposition and demonstration might take place after the size comparison.)

A basketball has an average diameter of 24.6 cm (9.7 inches) vs. a tennis ball, which has an average diameter of 6.7 cm (2.6 inches). The ratio between these two diameters is 0.273, which is the same (to three digits) as the ratio given on the Wikipedia page for the Moon: Mean radius 1737.10 km (0.273 Earths). If he had used a baseball, which is slightly larger, this would still be good enough for demonstrative purposes, as it would have been with an apple.

It is common to describe the relationship between very large (and very small) objects by analogy to common objects on a more human scale. Here is a similar example where someone has made a comparison of the sizes of the Solar system based on a Sun the size of a basketball. And here, coming from smaller scales, is an example that states the following: "Imagine an atom magnified to the size of a football stadium. The nucleus of the atom would be the size of a pea in the centre of the stadium."

It is almost certainly not a coincidence that this comic was released on Earth Day, which is celebrated annually on April 22 to demonstrate support for environmental protection. This seems to be something that Randall cares about a lot, as he has made several comics demonstrating the need for the human race to begin taking better care of our globe. See, for instance, 1321: Cold and 1379: 4.5 Degrees.

This comic clearly demonstrates four examples where the inhabitants of Earth did not take care of the well being of our globe, although here on a somewhat grander scale than what individuals can usually do. The typical case is that people did not do this out of bad intentions, but only because they were careless, curious, playful, or just plain stupid.

This comic may be seen as a spiritual successor to 445: I Am Not Good with Boomerangs and its follow-up, 475: Further Boomerang Difficulties in depicting various failed outcomes to the same opening panel.

Interruptions[edit]

The four interruptions are described and explained below. Each of the four attempts has its own row of four panels in the comic. It is clear from panels one and two in each row that the Basketball Earth is rotating quite fast compared to the time frame of the comic since the continents have moved considerably between frames. It is thus not necessarily the interrupters that have moved the Basketball Earth between frames two and three, except of course in the final interruption.

No matter how fast it rotates or whatever happens, we always see the Basketball Earth from the same side, as seen from far above the Atlantic Ocean. We can see the continents of the Americas as well as Africa and sometimes part of Europe, all of which are the borders for this ocean.

It seems most likely that Cueball starts all over every time, with a completely fresh and new Earth-Moon system, since they look the same regardless of the catastrophe befalling the prior Basketball Earth, and the interruptions—the second especially—would be difficult to reverse. We can thus suppose that there is still "normal" life going on for each Basketball Earth before the interruption. Most or all of this life would presumably perish for all of the last three cases.

In the first interruption, Black Hat comes in and is amazed by this cool floating globe. Of course, being Black Hat, he has to prod this nice globe with a digit. But by putting his finger into one of the oceans of this "real" Basketball Earth without a second thought, he apparently generates a megatsunami that rolls in over an unidentified city with skyscrapers, utterly dwarfed by a breaking wave.

This is similar to a scene in "Men in Black II" where K messed with a globe that actually is a small planet, and his finger becomes visible in the sky of its inhabitants. It is also similar to a "Pearls before swine" strip where the character Pig encounters Atlas and the earth in a diner, points to where he lives, and accidentally pokes himself in the eye. It is also reminiscent of Deep Impact in which a meteor strike causes exactly such a tsunami to hit the East Coast of the United States. Since Black Hat puts his finger down in the Atlantic Ocean, the tsunami would hit all bordering

coastlines. Since the coast seems to be an eastern coast (assuming a vantage point of South --> North), and because Randall lives there, the city could be New York City or Boston or one of the other large US cities on the East Coast. Of course, the wave would also affect the coastline (far into land) for all the other continents.

The second interruption occurs when Megan arrives and pours liquid (perhaps water) from a sports water bottle onto the Basketball Earth, seemingly flooding its entire surface. This would cause extensive flooding, almost certainly extinguishing all multicellular land-dwelling life. The most familiar analogous situation is from the Bible in the Genesis flood narrative about Noah's Ark. The deluge from Megan's bottle would also change the composition of the ocean and create enormous churn and pressure changes, with widespread or catastrophic effects even on multicellular marine life. And if it were some sort of sports drink inside...

In the third interruption, a cat walks into the shot and then playfully attacks the Basketball Earth, rolling around like it would do with a ball of yarn (see real-life example in this video). This also seems to be an allusion to the logo of the popular web browser Mozilla Firefox, which depicts a fox curled around the earth in a similar manner to that shown in the comic.

The people living upon this Basketball Earth would experience cataclysmic events far greater than Blackhat's digital prodding caused, especially as the Basketball Earth is no longer suspended and was thus taken "out of its orbit" and will eventually hit the floor very hard. One way or another, that will surely cause (undepicted) disasters of tremendous magnitude.

In the fourth and final interruption, Ponytail uses Basketball Earth as an actual basketball. She comes running by Cueball, grabs the Basketball Earth, probably bouncing it off the floor while dribbling towards the basketball hoop where she actually jumps in an attempt to dunk the Basketball Earth. This would not be good for any residents of Basketball Earth[citation needed]; the combined pressure, movement, and impact damage from this simple sequence would surely kill off all complex life on Basketball Earth.

Title text[edit]

This simile-callback is continued in the title text with the idea that "every basketball in existence" (i.e., every basketball upon the Basketball Earth, as well as the Basketball Earth itself) is counted towards the score from a single dunking. Randall may have a good estimate of how many basketballs there are, perhaps through research for some what if? question or other research, but almost certainly assumes that there are no extraterrestrial basketballs not on Basketball Earth. But there might be some question about whether the Basketball Earth's own sub-scale basketballs fall within the regulations.

If we go by the strict rules of league Basketball, the answer would only be two points, as it is illegal to have more than one basketball in play at a time.

#1516: Win by Induction

April 24, 2015
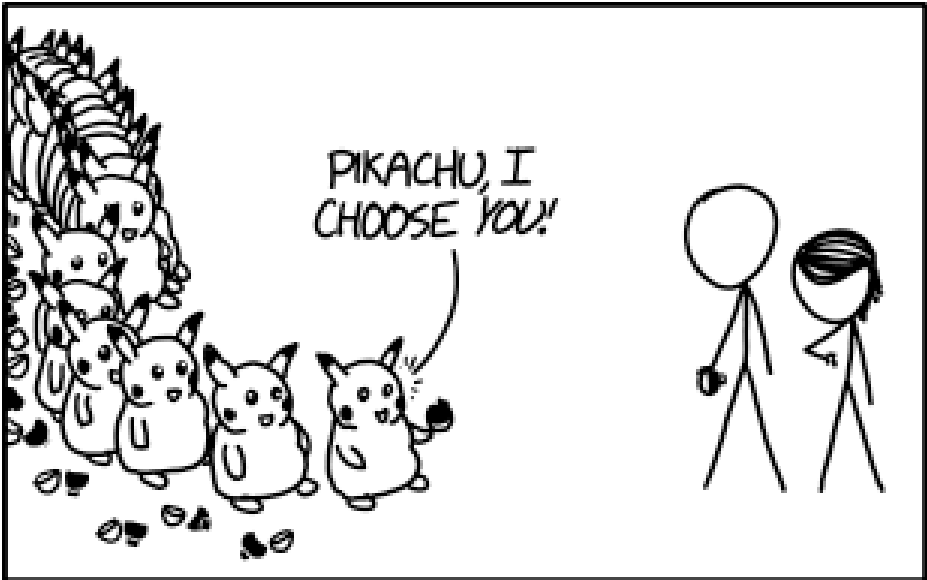
This would be bad enough, but every **30**th or **40**th pokball has **TWO** of them inside.

Explanation

In the Pokémon franchise, human characters called Trainers capture fantastical creatures from the wild, the titular Pokémon (a shortened form of "Pocket Monsters"), and train them to battle one another. Pokémon are captured and stored in devices called Poké Balls, which shrink the creatures down to pocket size (hence "Pocket Monsters"). The anime's English dub has enshrined the phrase "<Pokémon's name>, I choose you!" into popular culture memory. When Trainers do battle, they often shout this phrase while throwing the ball to the ground, releasing the Pokémon at full size.

In this comic, a Pokémon chosen at some point was a Pikachu (the "poster child" for Pokémon, and the most publicly-known type), which does not intend to engage in the battle himself. Instead, the Pikachu chooses another Pikachu to fight for him. This process then repeats itself. Behind the Pikachu with the Pokéball is a long line of other Pikachu, suggesting that this process has been going on for a while.

Nearby stands Cueball, holding a closed Pokéball, and Megan, looking at her watch. This suggests that Cueball intends to have his own Pokémon fight the Pikachu, but is waiting to see which enemy his Pokémon must face before the battle can actually begin (waiting in vain, if the above described process repeats indefinitely), while Megan is growing impatient with the delay. Given that Cueball is holding a closed Pokéball he has not deployed

yet, Megan cannot herself be his Pokémon. She could be his opponent, a spectator, or teammate.

The joke in this comic comes from analogy with the mathematical proof by induction, which is a proof about a base case, followed by a never ending sequence of steps, each step leading to the next. Induction proves an assertion is true for one case, and then infers that it must also be true for all related cases. The title suggests that the process of Pikachu choosing Pikachu will never end, effectively postponing the battle indefinitely. But the title is win by induction, by which Randall implies that we have been given enough information to reason logically whether Megan or Cueball will win. We have here turned mathematical induction on its head: part of the humor in the comic is that the logic of induction doesn't work in reverse. We cannot reason about an initial case by inferring something from a related case whose proof is dependent on knowledge about the initial case. Or perhaps the "win" referred to is precisely that the battle is indefinitely postponed.

The name "induction" comes from logic and discrete mathematics, and is thus unrelated to the physical phenomena of electromagnetic induction; but the fact that Pikachu is an "Electric-type" Pokémon could be word play connecting the two ideas.

If there were always only a single Pikachu in each Pokéball, this would spawn an unlimited number of Pikachu growing at a constant rate. Since, as the title text notes, there are occasionally two of them in a Pokéball,

this would lead to exponential growth assuming each of the spawned Pikachu in this case is bearing a Pokéball! This may be a reference to the rate of twins, which is approximately 1/30 in humans.

Pikachu was used in one of the storylines of 1350: Lorenz. See all the attack moves it made here.

#1517: Spectroscopy

April 27, 2015
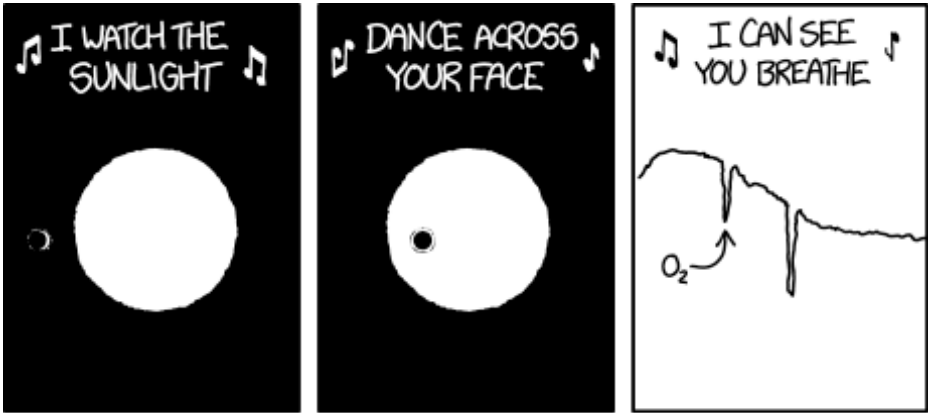
FAITH HILL ON EXOPLANET SPECTROSCOPY

Although right now I'm more excited about ESPRESSO's radial velocity measurements, so I'm listening to This Kiss, her song about measuring "centrifugal motion" on "a rooftop under the sky".

Explanation

This comic mixes the method of using spectroscopy to detect oxygen on exoplanets (planets outside our Solar system) with the lyrics for the Faith Hill song "Breathe" (listen to "Breathe" on YouTube).

From the lyrics:

[...]

In the comic the word "feel" has been changed to "see". The two first panels are one line in the song. The last line is from the chorus and is repeated five times during the song, although not right after the first two lines.

In the first and second panel the singer examines the spectra of a remote planet by watching the sunlight during the transit of the planet as this sunlight dances across the planet's face. Finally we determine that breathable oxygen exists. Since we cannot (as Faith can) feel the planet we have to see it. And by doing this I can see you breathe.

Measuring the light output of stars (spectra) we are able to determine a number of details of the star, including rotation, relative radial velocity, chemical composition, temperature, and to some degree, distance and size. When a planet, as pictured, moves between the star and the observer, then by looking at the spectrum received, the viewer is able to determine the contents of the planet's atmosphere from the specific wavelengths of

light that are absorbed in this. If it turns out that the atmosphere absorbs the lines corresponding to molecular oxygen (O2) this is a clear indication that the planet has large quantities of breathable oxygen (but not necessarily life). However, there must be oxygen in large amounts in the atmosphere to sustain most of the life forms that we know of here on Earth (though not all). It is thus clear why Randall would be interested in exoplanets with oxygen.

This comic came out four days after this article about NASA's New NExSS Initiative. NASA will search for signs of life on other planets, for instance by using "the light passing through the atmospheres of these exoplanets". And they "will study chemicals that have been detected on other worlds, such as oxygen and methane, to see if they were produced by biology".

The title text refers to determining radial velocity in the ESPRESSO program (Echelle SPectrograph for Rocky Exoplanet- and Stable Spectroscopic Observations). By noting that the radial velocity of the star changes slightly as the planet that orbits it moves around the star (centrifugal acceleration), the ESPRESSO program should be able to detect the masses of planets as they are moving towards the Earth in their orbit around their distant stars. The ESPRESSO program is so precise that it should be able to detect planets as small as Earth and the other of the Solar system's inner planets.

Randall is now even more excited about ESPRESSO than he is about the oxygen levels, because it is now

possible to detect these "very" small planets. So he is no longer listening to "Breathe", but to another Faith Hill song: "This Kiss" (listen to "This Kiss" on YouTube).

From the lyrics:

[...]

The first line is part of the chorus and it is repeated four times, but Randall has changed the main word to "centrifugal". There is, however, disagreement online whether it is centripetal or centrifugal.

The second line is not sung in connection with the chorus, and it is only changed a bit, so "the" is changed to "a". Also the "on" which is part of his line here is not part of the quoted line in the title text.

The song is not about measuring but, of course, about "The Kiss". Since the ESPRESSO is part of the Very Large Telescope, it is located on the Cerro Paranal mountain in the Atacama desert in Chile at an elevation of 2,635 meters (8,645 ft.) above sea level. So it could be said that it is measuring on a rooftop under the sky. Although it is radial velocity it measures, not centrifugal motion, the object it does measure will all be experiencing this fictitious force (also see 123: Centrifugal Force), as the planets are in orbit around a star.

Randall has previously made several references to exoplanets in his comics, most notable are the two comics with the same name: 786: Exoplanets and 1071:

Exoplanets. The latter comic came out when there were exactly 786 exoplanets found. Today more than 1900 have been discovered (1915 as of Wikipedia on the release day of this comic), much more than twice that amount. And now they can find even smaller planets, and detect the atmosphere. Much have happened since the first exoplanet comic came out in 2010. Five comics later in 1522: Astronomy he mentions astrobiology in the title text, closely relating it to this comic.

#1518: Typical Morning Routine

April 29, 2015

Hang on, I've heard this problem. We need to pour water into the duct until the phone floats up and ... wait, phones sink in water. Mercury. We need a vat of mercury to pour down the vent. That will definitely make this situation better and not worse.

Explanation

Waking up to an alarm can be annoying, especially when it is your partner's alarm, and they are slow to wake up and even then have difficulty figuring out how to turn the alarm off. This comic takes this situation to a ridiculous extreme, from whence the comic derives its humor, especially when paired with the title describing this situation as a "Typical Morning Routine". Of course the typical could refer only to the part of the "routine" until the phone is dropped into an air vent.

In this comic, Hairy with morning hair is shown using his smartphone as his alarm clock. Another unseen person is sharing the bed with Hairy and growing more irate as Hairy's alarm continues beeping.

Even simple actions like turning off an alarm can be easily fumbled by a just-awakened groggy person. In this case, Hairy accidentally exited the alarm app without stopping the alarm. In some OSes, simply exiting the app doesn't close it, requiring you to use the app switcher to close it.

After giving up on shutting down the alarm the usual way, Hairy, in annoyance, decides to remove the battery, which will disable the phone's entire operation. However, while trying to remove the battery in the dark, he accidentally drops his device down a floor air vent (most likely part of forced air central heating common in North America) next to the bed. While the vent is

covered by a grille, it is apparently coarse enough (or perhaps missing a few pieces, creating a large hole) to allow the phone to pass through if it falls at a particular location and angle. Also, the vent apparently does not descend very far before bending, allowing the phone to survive the fall intact.

As of when this comic was posted, Randall uses both iOS and Android according to 1508: Operating Systems—although there is no reason to be certain that the character in this comic is using the same operating systems as Randall. However, the fact that Hairy tries to remove the battery strongly suggests it cannot be an iOS device, given that all iOS devices have non-removable batteries.

If he were a little handy, Hairy might be able to open the vent and retrieve the phone—or perhaps not, if the phone slid further into the ventwork or Hairy lacked the necessary tools. Instead of trying to physically recover the phone, Hairy attempts to remotely brick the phone from his laptop, permanently disabling all its functions (including the alarm app).

This attempt fails because Hairy had accidentally put the device into airplane mode before dropping his phone, thereby cutting off all wireless communications with the device and preventing any attempt at remote control. Airplane mode also has the unfortunate (in this situation) side effect of increasing the phone's battery life (though playing loud sounds incessantly should still limit it to a day or so, notwithstanding the pessimistic

assessment of Hairy's companion).

Rather than finding a solution to the problem with the phone, Hairy proposes that they just move out instead.

Relevant for the title text: There is a semi-common logic puzzle involving a ping-pong ball falling down a pipe with a kink in it. In this puzzle, the solution is to pour water into the pipe until the ping-pong ball floats up.

In the title text, one of the two characters remembers this problem and attempts to apply it to this situation. Since phones do not float in water, a modified version is proposed using mercury instead. The phone would certainly float on mercury, as it is a very dense liquid (the only metal that is liquid at room temperature).

The extremely toxic nature of mercury makes pouring it into the air supply a very dangerous idea. Also the required amount of mercury would be extremely expensive. The weight of the mercury would also be substantial (13.5 kg/liter or 113 lb/gallon), and would likely break something in the air duct system. Both mercury and water could also push the phone further into the duct system instead of bringing it back. The end of the title text, declaring that the mercury idea would definitely make this situation better and not worse could be either a sarcastic commentary on these problems or a desperate attempt to bolster confidence that this extreme solution will work when everything else has failed.

Given that Hairy was willing to sacrifice the phone

anyway (by attempting to brick it), he would probably be better off pouring water down the vent; it wouldn't bring the phone within reach, but – provided the phone isn't sufficiently waterproof – it would disable and thereby silence it.

Of course, Hairy probably wouldn't have gotten into this mess if he had not just been awakened brutally by a very loud alarm, making it difficult to think clearly (or, alternatively, if he just had a standard alarm clock that he could have unplugged or even a mechanical one that he could, say, hit with a hammer until it broke; or just flip the off switch).

#1519: Venus

May 01, 2015

VENUS WAS ONCE TEMPERATE. IT HAD SEAS AND RIVERS, AND VENUSIANS CULTIVATED VAST FIELDS OF BEAUTIFUL FLOWERS.

UNTIL THEIR GREENHOUSES FLED THE PLANET DUE TO THE RUNAWAY GREENHOUSE EFFECT.

THE VENUSIANS PURSUED THEIR GREENHOUSES TO EARTH, SETTLING IN THE NETHERLANDS AND KICK-STARTING THE DUTCH FLORAL INDUSTRY.

ANY QUESTIONS?

BECAUSE YOU'RE RETIRING IN A MONTH, DO YOU JUST NOT CARE WHAT YOU SAY ANYMORE?

WHAT?! I *RIDE THE SKIES* ATOP A SCREAMING BIRD OF TRUTH! ALSO, YES, I DO NOT.

The sudden introduction of Venusian flowers led to an explosive growth of unusual Earth pollinators, which became known as the "butterfly effect."

Explanation

Miss Lenhart is teaching a class on science about the planet Venus.

In the first panel, we see her teaching the history of Venus. Venus may have had water on its surface billions of years ago, but if that is true all hydrogen since then was eventually lost due to dissociation. However, there is no evidence that Venus ever had fields of flowers, or Venusians, or any other form of life.

The runaway greenhouse effect on the second panel is a play on words. While the term normally refers to a rapid rise in temperature caused by greenhouse gases, Miss Lenhart uses the term literally and claims the existence of sentient greenhouses that actually ran away from Venus. In reality, the effect caused Venus to develop a thick atmosphere of carbon dioxide, which raised its temperature above approx. 460 °C (860 °F), hotter than daytime on Mercury. This eventually destroyed all evidence of anything that had been on the surface of Venus billions of years ago.

The third panel ties the previous distortion of Miss Lenhart into the very real historic reputation of the Netherlands as flower growers, with a further fabrication by Miss Lenhart that the Dutch flower industry was in fact started by Venusians.

In the final panel we learn that she is a month away from

retirement and does not care about relaying accurate information anymore. She just wants to have a laugh at the expense of the naive school children, although it is clear that Jill in the front row was not fooled.

The title text jokes about the butterfly effect, the idea that a butterfly flapping its wings in Brazil can affect the trajectory of a tornado in the U.S. In this case the butterflies would just help pollinate the flowers. The butterfly effect, a part of chaos theory, is a term coined by Edward Norton Lorenz, who had the comic 1350: Lorenz named after him due to its chaotic nature.

Although Miss Lenhart was supposed to retire a month after this comic, she seems to return a year later for a university-level math course (1724: Proofs) and several years later for an astronomy course (2926: Doppler Effect), where she continues the trend from this class.

#1520: Degree-Off

May 04, 2015
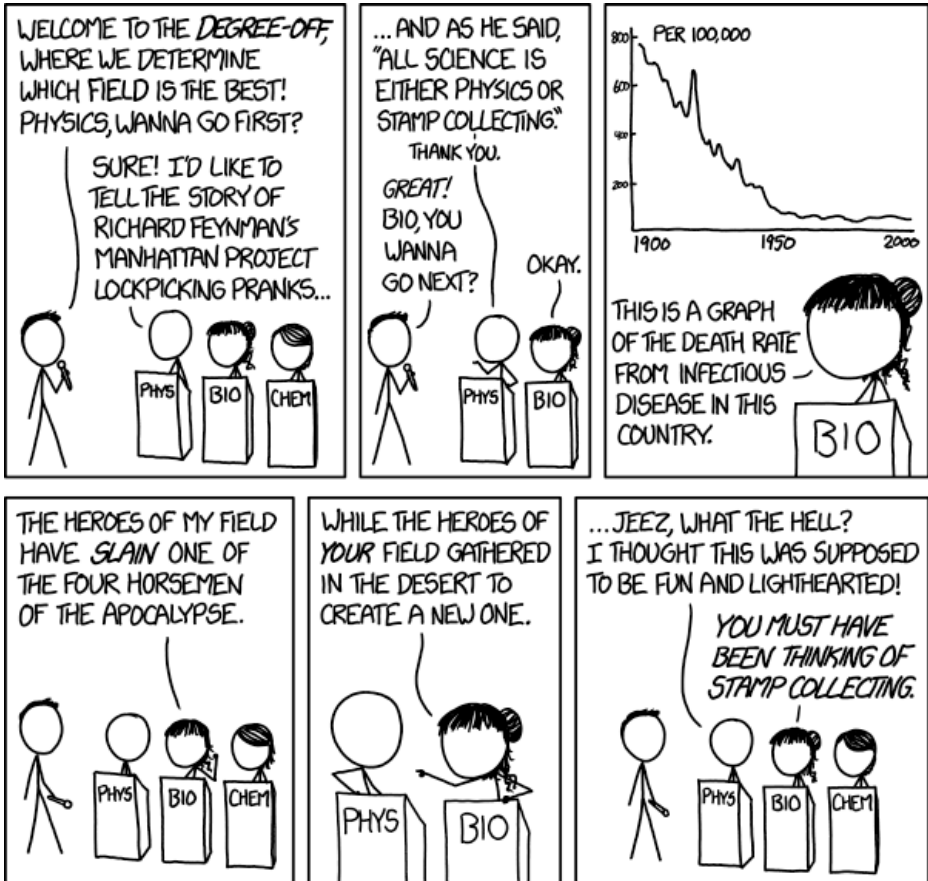
I'M SORRY, FROM YOUR YEARS OF CONDESCENDING TOWARD THE 'SQUISHY SCIENCES', I ASSUMED YOU'D BE A LITTLE HARDER.

Explanation

Cueball (physics), Hairbun (biology), and Megan (chemistry) appear to be on a talk show stylized as a game show called Degree-Off, hosted by Hairy, where representatives of different fields, try to explain why their field is the best and why to get a degree in their field. The title "Degree-Off" is a portmanteau of "degree", as in the recognized completion of studies at a school or university, and "face-off", a direct confrontation between people. A face-off has its roots in combat but does not always involve violence.

The host asks the physicist Cueball to go first. He light-heartedly begins to tell what appears to be long story, beginning with a Richard Feynman anecdote. During the Manhattan Project in Los Alamos, Richard Feynman got bored because of the isolation and started learning lock picking on the secret documents' safes. Using these new skills, he played lots of pranks on his colleagues, like leaving notes and spooking them into believing there was a spy among them (which, of course, there was). He finishes his case with a quote from Ernest Rutherford, implying that his speech was quite long and winding. The quote communicates the idea that physics is the only fundamental framework, so that the job of chemists, biologists and other scientist simply is to catalog and systematize observations ("collect stamps") on phenomena too complicated to presently be fully described in terms of physics. This idea was earlier lampooned by Randall in 435: Purity (and is also stated

in the title text of 1158: Rubber Sheet).

The biologist goes next, showing with a graph (see below) that the field of biology has helped reduce disease. She then goes on to claim that the heroes in biology (the part known as Medicine) have even "slain" one of the Four Horsemen of the Apocalypse. Different traditions designate the Four Horsemen differently, but it is common for their number to include Plague or Pestilence. Hairbun claims that the field of biology has eliminated widespread Pestilence. The imagery of Pestilence being thwarted by modern medicine was also used in the book Good Omens, by Terry Pratchett (of whom Randall is a fan, see 1498: Terry Pratchett) and Neil Gaiman, where Pestilence has retired after the discovery of Penicillin, and been replaced by Pollution.

The graph shows the death rate from infectious disease in the USA with the range of 1900-2000. The spike is attributable to the 1918 flu pandemic. It has been published in the paper Trends in Infectious Disease Mortality in the United States During the 20th Century.

The woman then goes on to directly accuse Cueball (i.e. physicists) of creating a new Horseman to replace the one slain by the biologists. She refers to the development of the atomic bomb, which was built and tested in the New Mexico desert. The new horseman is therefore the atomic bomb, or the various perils associated with it.

The woman's implied condemnation of the physics community has been echoed by some of the scientists

involved in the project itself. After the test detonation of the first nuclear weapon on July 16, 1945, J. Robert Oppenheimer, the director of the Los Alamos National Laboratory, found himself inwardly quoting the Bhagavad Gita: "Now I am become Death, the destroyer of worlds." Kenneth Bainbridge, the organizer of the actual Trinity test (which he called a "foul and awesome display"), remarked more prosaically to Oppenheimer that day, "Now we are all sons of bitches."

This harsh moral judgement shocks Cueball, who exclaims "I thought this was supposed to be fun and lighthearted!" While the set-up is of a frivolous friendly competition, the woman's presentation is surprisingly dark. Her retort in the final panel reveals that she was angered by the off-hand dismissal of 'soft' sciences as "stamp-collecting" and turned the game from a light-hearted fun into something more serious.

In the title text the biologist goes on to declare in All caps that she is surprised a physicist isn't "harder", after all their condescending towards the "squishy" sciences. The use of 'hard' and 'squishy' is a play on the colloquial division between the so-called 'hard' sciences (such as physics and chemistry) and 'soft' sciences (such as biology and geology). 'Hard' sciences usually refer to the perception that in fields like physics, precisely repeatable experiments and measurements are possible, as opposed to 'soft' sciences seen as placing less emphasis on precisely quantifiable predictability - however Hairbun is extending 'hard' to its meaning of 'stoic', mocking Cueball for not being able to weather a personal moral

attack. Again, she is indicating that she's upset by directly referencing a mocking portrayal of other fields allegedly made by Cueball.

To be fair to Cueball, the outbreak of disease is more a topic for epidemiology, and biology has spawned multiple diseases, atrocities, and bad movies. However, the Manhattan Project marked the first time in history that humanity possessed the ability to destroy itself — and shortly thereafter humanity got perilously close to doing so.

In 520: Cuttlefish Randall shows that he personally respects biologists — or at least fears them.

Within a year Randall has made several other comics about nuclear weapons, this one was the first of these the second, 1539: Planning, came out just 1½ month after this one and after that these two were released early in 2016: 1626: Judgment Day and 1655: Doomsday Clock. Nuclear weapons are also mentioned twice in Thing Explainer, specifically they are explained in the explanation for Machine for burning cities about thermonuclear bombs, but they are also mentioned in Boat that goes under the sea about a submarine that carries nuclear missiles. All three comics and both explanations in the book, does like this comic, comment on how insane it is that we have created enough firepower to obliterate Earth several times (or at least scourge it for any human life).

#1521: Sword in the Stone

May 06, 2015

That seems like an awful lot of hassle when all I wanted was a cool sword.

Explanation

In this comic, Megan pulls a sword out of a stone. A flash of light comes down and music plays, and a heavenly voice tells her she has ascended to the throne of England. Megan then pulls out her phone and searches on Wikipedia for England. After having read for a while, she decides she does not want the throne of England and slowly places the sword into back the rock, without taking her eyes off the text.

The comic references the fables of King Arthur and the Knights of the Round Table. In Arthurian legend, whoever can remove The Sword in the Stone is the lawful king of Britain (although this comic, as some versions of the legend, refers incorrectly to England). Arthur is an orphan being raised in secret; he notices the sword, removes it, and is proclaimed king. The sword is sometimes identified as Excalibur, although in other versions Excalibur was acquired by King Arthur from the Lady of the Lake. The most familiar version of this story is The Sword in the Stone by T. H. White which is based on Le Morte d'Arthur by Sir Thomas Malory. The animated musical by Walt Disney is a well-known version of this fairytale based on White's book.

A key element in the joke is that as Megan begins to read about England, especially information concerning being an English ruler, she quickly thinks better of this and begins to put the sword back in its place. The punchline that Megan puts the sword back after reading about

England suggests that the "gift" of being the leader of England is not worth the risk and/or work associated. British history is rife with monarchic strife, and a brief inquiry into their causes of death will show that almost one in three British rulers have died either in battle or from murder, etc: Queen Elizabeth II, who was alive at the time of the comic's release, is the only English monarch to die of (exclusively) old age. This would quickly lead most people to conclude that the risks associated with ruling England far outweigh the benefits.

The title text furthers this plot, having Megan comment on the hassle when the only thing she was interested in was the cool sword. Apparently, Megan is not enthusiastic about power, and her choice is made when she sees how problematic it could be to reign over the country of England. There is also a subtle play on the fact that in the T. H. White version, Arthur likewise is unaware of the significance of pulling the sword from the stone - he is simply looking for a sword to replace the one belonging to his step-brother Kay that was stolen under his watch, to avoid embarrassment and reproach.

From the time of the Roman Empire all the way up to Charles II's reclamation of the throne, the area now known as England has seen several migration waves, Viking raids, invasions and fierce power struggles among aristocratic families. Besides the constant threat of usurpation, as evidenced by the numerous wars for the crown, such as the Norman conquest and the War of the Roses, there were also constant difficulties in managing the frontier regions. This can be seen from Hadrian's

Wall, a creation of the titular Roman Emperor designed to keep the ever difficult Scots out of the areas of Roman control (the Scots would be a constant problem for England up until the reign of King James VI and I; think of the movie Braveheart for a good example of the regular headaches they caused, seen from the English point of view), as well as the Welsh uprisings that occurred with such consistency that you could set your watch by them.

It is worth emphasizing that the term "England" is anachronistic in this context. At the time Arthur supposedly existed, there was no England — England was formed by Germanic tribes who settled in Britain between the fifth and seventh centuries. In many of the stories, including the earliest, Arthur was in fact depicted as a leader of the native Romano-Britons in their attempts to repel these invaders. England would not exist had Arthur succeeded. The anachronism is not new; it entered Arthurian legend in the Middle Ages. (Thomas Malory's Le Morte d'Arthur, for example, refers to Arthur as King of England.) In Arthurian legend, it was stated that Arthur would return when needed (in some versions he was explicitly associated with the Mab Darogan, a Welsh Messianic figure who would finally drive the English out of Britain and reclaim it for the native Britons). It is possible that Megan in this comic is a 21st-century reincarnation of Arthur.

The timing of this comic might relate to the birth of princess Charlotte Elizabeth Diana on May 2, 2015, just four days before this comic, and the burden of a royal of having a whole life in public shaking hands of strangers.

Since 2013 the line of succession was changed to absolute primogeniture, meaning that she will keep her current position in the line (3rd after her older brother) even though she now has a little brother. Before this year, that would not have been the case, as the male gender took rank over birth order.

It is also probably not a coincidence that this comic was published the day before the UK General Election, occurring on May 7, 2015. This election decides the modern-day leader of the UK. And the problems they face today may even be more likely to cause Megan to give away the throne, than the risk of untimely death she would have faced in Arthur's days. A similar Wikipedia gag appears in 911: Magic School Bus. The sword in the stone also appears in 2578: Sword Pull.

#1522: Astronomy

May 08, 2015
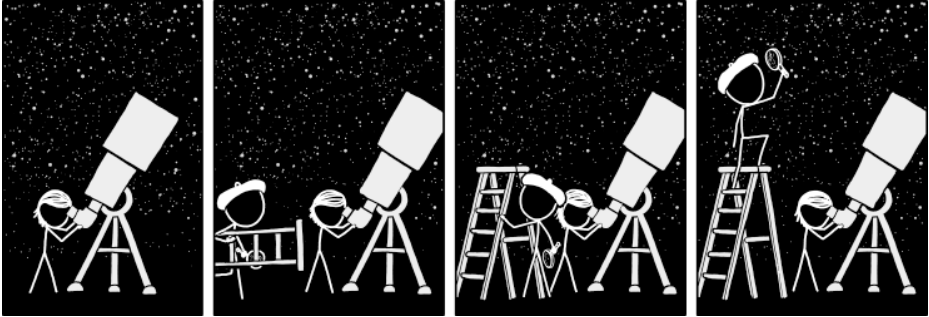
Astrobiology is held back by the fact that we're all too nervous to try to balance on the ladder while holding an expensive microscope.

Explanation

For objects at a great distance one can achieve a better view by using a telescope as it is the typical method in Astronomy. Looking through a lens or a microscope in biology and other disciplines does magnify short distant objects. And a magnifying glass works more like a microscope when your eye lense is close to the focus of the magnifying glass, but when looking at distant objects you have to increase the distance between the glass and your eye where the focal length of your magnifying glass must be increased to meters instead of centimeters or less on a close view. But in general a Galilean Telescope works at the same principle as a magnifying glass together with your eye lens, the magnifying glass only has to have a long focal length which is optimized for far distances.

In the comic, the objects being viewed by Megan could be stars, galaxies and the planets of our Solar System. Megan is using a telescope. Beret Guy attempts to view them using a step-ladder to get closer to the stars, and then looking at them through his simple hand-held magnifying glass. This approach could be successful only if the stars were a few meters away, so that the ladder would take him within a few centimeters of the study object. In fact the visible stars are several light years away (typically 18-20 orders of magnitude further away) and getting two meters up on a ladder won't make any perceivable difference.[citation needed] (Unless, of course, you are Beret Guy.)

The title text assumes (for comic effect) that the only thing wrong with Beret Guy's strategy is the instability of the ladder endangering the expensive microscopes used by biologists for Astrobiology. Astrobiology is the study of life (or the possibility thereof) elsewhere in the universe, and here it would be either the planets and moons in our Solar System or exoplanets they needed to look at. This is the second comic related to studying exoplanets in two weeks, the first being 1517: Spectroscopy (see more references there).

Since we cannot go there, they do, of course, not use any microscopes in the direct studies. However, one typical magnifier in biology is the electron microscope, used to study microbiology, and they cost a lot and are very heavy. It is therefore inadvisable to carry one up a ladder, and it could possibly become very expensive if you did try it anyway.

#1523: Microdrones
May 11, 2015

Panel 1:
SO HOW DO WE REGULATE ALL THESE MICRO DRONES?

I MEAN, AMAZON DELIVERY BOTS SOUND COOL...

Panel 2:
BUT I WORRY THAT OVERNIGHT WE'LL REALIZE WE'RE SURROUNDED BY THESE THINGS, NO ONE WILL KNOW WHO'S CONTROLLING THEM, AND THEN *BAM*, SCI-FI DYSTOPIA.

Panel 3:
IF YOU WANNA SLOW IT DOWN, WHY NOT JUST REMOVE ALL REGULATIONS, BUT THEN MAKE DRONE THEFT LEGAL?

Panel 4:
...I *LIKE* THAT.

YOU WRITE TO CONGRESS. I'LL STOCK UP ON BUTTERFLY NETS.

Oh, weird, Amazon is out of butterfly nets.

Explanation

Amazon Prime Air is a drone-based delivery system by Amazon.com currently being rolled out to cities, but at the time was still in its conceptual stage. While on one level he thinks the idea is cool, Cueball worries about living in a sci-fi dystopia, with those drones flying all around him, tracking his actions, etc. In the third panel, Megan suggests sending a message to Congress, suggesting a law for making the stealing of drones legal. This would alleviate the problem of drones flying around everywhere because if they did people would catch them to use for themselves. In the final panel Megan begins to search for butterfly nets so they are ready to catch the microdrones when the law to make it legal to steal the drones goes through.

This tactic may not work as well as planned; drones will likely simply fly higher or employ other security measures since there are no regulations on drone behavior.

The title text suggests one of five things:

- Amazon is out of stock of butterfly nets due to everyone purchasing them to catch drones with, implying many people had the same idea like Megan.
- Amazon doesn't want people stealing their drones, so the nets are just suspiciously "unavailable".
- Non-Amazon individuals controlling the drones have pre-emptively purchased them all.

- Amazon has put all of its nets into a private stock, in order to steal other companies' or individuals' drones.

- Amazon's drones have already become self-aware, and have altered the database in order to prevent their capture.

Amazon drones is also the subject of the title text in 1625: Substitutions 2 and there are two quadcopters over the volcano lake in 1608: Hoverboard. Also, Cueball is abducted by seemly sentient drones in 1630: Quadcopter.

#1524: Dimensions

May 13, 2015

I would say time is definitely one of my top three favorite dimensions.

Explanation

This cartoon is a romantic musing about time, and how even though we may not always realize it the progression of time is one of the better things in life.

To accurately describe the world requires at minimum three spatial dimensions and the fourth dimension, time. The spatial dimensions don't necessarily have to be the familiar Cartesian system (Forward/backward, Right/Left, Up/Down), but can be described in many ways (like the spherical or cylindrical system). In spite of the fact that we are being pushed around the universe by being on Earth, we can exercise some control over these spatial dimensions by moving, and therefore our trajectory through these dimensions is not inexorable (impossible to stop). As we only can go one direction in time and have no way of changing the speed or direction, we also are figuratively being pushed through time, and this movement is inexorable.

Cueball sits under a tree un-moving with Megan simply enjoying the passage of time and says, "Of the four dimensions I could have spent my life being pushed inexorably forward through, I guess 'time' isn't the worst." All of this amounts to an unusually erudite way for Cueball to say he feels content with how his life has turned out, despite the natural doubts one has as they get older.

Rather less romantically, it is possible that Cueball has

merely been contemplating the fact that, if he were being inexorably pushed through one of the other spatial dimensions instead of time, he'd spend his entire life flying through space uncontrollably, maybe even out into outer space and to his death. Indeed, the unstoppable passage of time seems rather pleasant by comparison.

In the title text, Cueball then continues to muse about his favorite dimensions and places time in his top three dimensions. This means that one of the three spatial dimensions must be his least favorite. Though it is impossible to determine how he defines his favorite dimensions, as dimensions can be defined somewhat arbitrarily, they likely are length, height, and time as comics only use these three (time being represented by panels). Since rising steadily and digging downward are both pretty lethal, one could assume that Randall's least favorite dimension is up/down. (See also the one of my favorite halves comment in 1556: The Sky) This could also be a reference to 1190: Time.

Previously Randall has made a comic about a man who was pushed sideways — so he was pushed both through time and fell sideways: 417: The Man Who Fell Sideways.

#1525: Emojic 8 Ball

May 15, 2015

EMOJIC ⑧ BALL

How will I die?

ASK

Explanation

Emojic 8 Ball is a parody of the Magic 8-Ball using emoji instead of words. "Emojic" is a portmanteau of "emoji" and "magic".

A real Magic 8 Ball is a toy designed to visually resemble a real pool ball, which responds to questions (posed as yes-or-no questions) asked of it, ostensibly by magic. The responses are provided through a window on one face that displays text phrases printed on a triangular shape as depicted in this comic. Vintage balls contained a die with multiple triangular facets suspended in a dark fluid, while modern balls feature an electronic screen.

The ball in this comic provides responses in the form of graphical Unicode "text" (which this comic is suggesting are emoji).

It is possible that this may be commentary on the inclusion of such "meaningless" symbols into Unicode. Ask a question and get a meaningless reply, even more meaningless than the answers given by a Magic 8 Ball.

It could also be commentary about the ambiguous nature of advice from fortune tellers, horoscopes, etc. Each emoji has an ambiguous meaning (for example, depending on context, the cow symbol could refer to beef or farming). The interpretation has more to do with the person receiving the fortune than anything given by the so-called fortune reader.

With the default question being "How will I die?", this may also be partially a reference to "Machine of Death". This book from 2010 is a collection of short stories edited by amongst other Ryan North (of Dinosaur Comics) mentioned here since the idea was based on one of his comics. Since Randall Munroe wrote one of the stories the reference is very likely. All the stories are based around a device, the "Machine of Death", that can predict, with 100% accuracy though generally with extreme ambiguity, how people die from a drop of their blood. In many of the stories very unusual deaths are predicted, often in a very literal way, but not so you know when or where you will die. From the official home page the entire book can be downloaded for free as a PDF file(broken) 2020/06 archive.org copy. (Randall's story begins on page 421 - or page 218 of the two sided PDF file. It is simply called "?"). The "Machine of Death" is also referenced in the title text of 1341: Types of Editors.

Emoji were previously referenced in 1513: Code Quality. Emoji has since then become a recurrent theme on xkcd. But this is the first one with Emoji in the title.

Permalink[edit]

- After the first time you ask a question a permalink will appear below the panel in light blue letters, the same colour as links on the rest of xkcd.

- The "permalink" is an actual link of the type that is called a "permalink", a portmanteau of "permanent-link".

- If you wish to "save" any given question and combination of emojis for future reference (for instance one where you think the combo makes sense to your question) you can do so by copying down this link.

- The last two years April Fools' Day comics, 1350: Lorenz and 1506: xkcloud also used the concept of a permalink.

- The permalink option did not appear in the comic when it was first posted. This has been seen before.

- Here a three examples with one, two and three emojis in the reply

permalink with 1 emoji.

Question: Why am I so sad?.

The answer is one emoji [(Wheelchair symbol)] (A reply that actually makes sense as to why you might feel sad)

permalink with 2 emojis.

Question: What should I wear tomorrow?. (Version 1)

The answer is two emoji [(bank) and (meat on bone)]

permalink with 2 emojis.

Question: What should I wear tomorrow?. (Version 2)

The answer is two emoji [(eggplant) and (water splash)]

permalink with 2 emojis.

Question: What should I wear tomorrow?. (Version 3)

The answer is two emoji [(woman's clothes) and (jeans)]

permalink with 3 emojis.

Question: Where will I be after tomorrow?.

The answer is three emoji [(Japanese castle),   (top hat) and
 (blowfish)].

This is also available as a picture - it is the picture linked to above
the explanation.

Bugs[edit]

Note: if you see mostly squares (possibly with six numbers/letters
inside) in the 8 Ball instead of actual symbols or pictures, it means
your system doesn't have fonts that support the Emoji unicode
characters.   Scroll down to the discussion section below for
suggestions on how to get and install the right font for your
system, as well as to see a list of emoji characters so you can easily
see if they're working or not.

#1526: Placebo Blocker

May 18, 2015
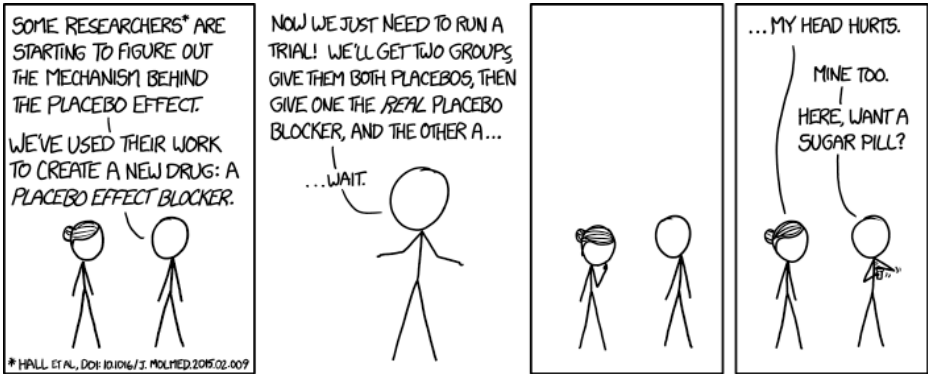
They work even better if you take them with our experimental placebo booster, which I keep in the same bottle.

Explanation

This comic is a joke about the difficulty of testing a drug that is supposed to block the placebo effect.

A placebo experiment is used for testing a drug candidate. It has two groups: one that gets a real drug candidate, and one that gets a fake. The placebo effect describes the observation that the group that gets the fake often show signs of having received a working drug - though commonly weaker than in the group that gets an effective real drug.

Cueball states to Hairbun, with a citation from the real world, that his team created a Placebo Blocker, a drug designed to prevent the placebo effect. Cueball begins to design a test for this new drug. Following typical experimental design, patients would be split into two groups: a control group, and the group that receives the treatment.

Cueball knows that the treatment given to the control group is supposed to be designed so that it is not influenced by the variable trying to be isolated. As the placebo effect is the effect under investigation, a placebo can not be used as a control treatment as a comparison with a placebo blocker. Cueball tries to design around this. In his test, both groups would receive a placebo as a treatment for an unspecified condition (the Treatment Placebo); in addition the test group would receive the Placebo Blocker drug, while the control group would get

a placebo pill instead (the Placebo-Blocker Placebo). If this works as expected, the Treatment Placebo would be blocked by the Placebo Blocker in the test group, while in the control group, the Placebo-Blocker Placebo may have a placebo effect in blocking the placebo effect of the Treatment Placebo, and the difference between these effects can be measured to test the effectiveness of the Placebo Blocker.

Cueball and Hairbun think about this trial until they both develop headache from frustration. Cueball then kindly offers Hairbun a sugar pill. While this might have helped cure the headache via the placebo effect had he told her it was a headache treatment, by revealing the pill as merely a sugar pill, it may reduce the effect (though it has been shown that placebos tend to work even if the subject is aware that they are placebos).

In the title text, Cueball mentions that his sugar pills against headache works even better together with the new experimental placebo boosters. Incidentally, he indicates that he keeps those in the same bottle with his sugar pills. Assuming someone believes placebo boosters are in the jar this would allow them to take the sugar pills and receive a greater placebo effect, as the placebo effect is based upon faith in the treatment, regardless of whether there are placebo boosters in the jar.

It is possible but unlikely that:

- Cueball's sugar pills are, in fact, the Placebo Blockers themselves and that, seeing Hairbun has a headache,

Cueball is inspired to somehow use the opportunity as an experiment to test the Blockers

- Cueball is suggesting Hairbun take a "placebo booster" which is really a "placebo blocker", thus testing the blocker he mentioned earlier in the comic.

Questionable neuroscience research is also discussed in 1453: fMRI.

Placebos[edit]

The placebo effect refers to the phenomenon in which patients given an inactive treatment such as a sugar pill can still show improvement relative to an untreated patient. The placebo effect is thus very important to consider when testing new drugs, since even ineffective drugs can have a positive effect on the patients due to the placebo effect. Modern drug experiments are hence conducted as double-blind trials, where the patients are randomly given either the treatment or a placebo without either they or the administering doctors knowing who receives the new drug and who received the placebo pill. (It is important that the doctor does not know, as if they did, it may affect the way they interact with the patient.)

Generally the patients need to believe that they are receiving an active treatment, but one study showed that the effect can occur even if the patients are told that they are receiving a placebo pill. The key factor seems to be that the patients must believe that a positive effect will occur. For example, (1) patients experience a greater effect if they believe that the treatment is expensive and (2) patients who know that they have not been given an active treatment will experience the effect if they are told that placebos

can have a positive effect through the power of the mind. Furthermore, the placebo can increase the effectiveness of treatments which seem larger (this is why over-the-counter pain medication is often administered as two half-doses rather than just one full dose).

Several reasons for the placebo effect have been proposed, from study artifacts - such as under-reporting of negative outcomes by patients who think they are being treated, to neurological explanations for how mental state can translate into physical outcomes.

Placebo-blockers do actually already exist. A side-effect of the opiate antagonist Naloxone is that it blocks the placebo effect.

It should be noted that placebo does not actually improve the objective condition, only the patient's subjective perception of it (i.e. the patients do not get better more than they randomly would, but the placebo makes them think they do).[actual citation needed]

Mechanisms of the placebo effect[edit]

The placebo effect is one of the greatest mysteries in modern medicine. It is typically found that the placebo effect is an effective treatment in itself in addition to the effectiveness of drugs and other treatments, and it has been found to cause small improvements to cancer outcomes. In other cases such as pain relief, the placebo effect is claimed to be comparable with the effectiveness of the drug itself - but this is a misunderstanding: this is not evidence of placebo working, but of the drug not working.

The comic refers to the recent study by Kathryn T. Hall, Joseph Loscalzo, and Ted J. Kaptchuk. (2015) Genetics and the placebo effect: the placebome. Trends in Mol Medicine. Volume 21, Issue 5, May 2015, Pages 285–294 - however, bear in mind that one has to treat studies very carefully Kaptchuk vs Placebo

It is possible to test the placebo blocker using three groups: a test group who receive a placebo and a placebo blocker, a control group who receive a placebo but no blocker, and a second control group who receive no treatment whatsoever, as a lack of treatment is the variable that an actual placebo is designed to control for. Still it might be hard to determine if the pills are having a negative effect or blocking the placebo effect, so multiple trials with multiple illnesses may have to be carried out.
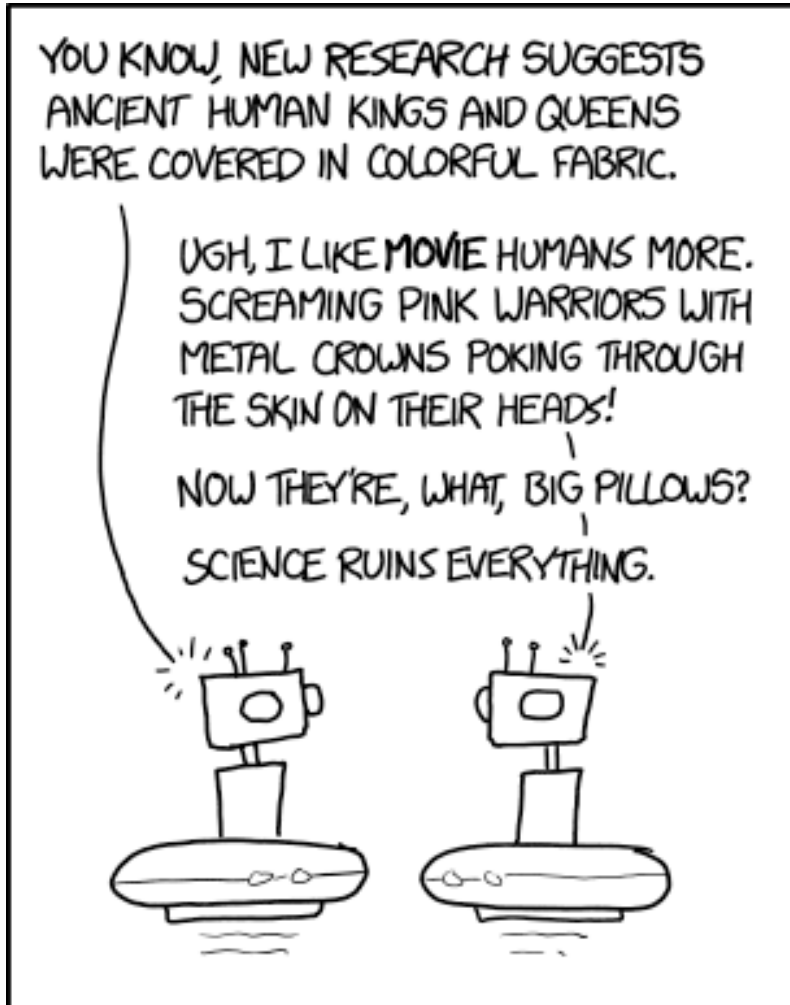
At this point, if we're going to keep insisting on portraying dinosaurs as featherless because it's "cooler", it's time to apply that same logic to art involving bald eagles.

Explanation

The comic is set in the future, with two hovering robots discussing ancient history, in particular the clothing styles of kings and queens of the now extinct human species. It appears that robot archeologists have long ago unearthed remains from one or more human civilizations, providing evidence to build a concept of what humans must have looked, acted and even sounded like. Recently they must have discovered or determined new evidence, which presumably indicates the wearing of colorful clothing by human monarchs. Until this occurred they had very little if any reason to believe that any humans wore clothing. Noting the previous knowledge that some humans had metal rings around their heads, they have drawn the conclusion that these formed a separate species "Human Kings" and the crown is a natural outgrowth of the skeleton. Alternatively, the narrative of the fictional, horned Star Wars Zabrak species may have somehow survived into the era of robot film and misinterpreted as describing a human.

When dinosaur bones were first dug up, the idea that dinosaurs were scaly, reptilian-like creatures was developed with the information available at the time. In recent times, it's been discovered that most dinosaurs actually had feathers, and in well preserved specimens, often from the Jiufotang Formation in Northern China, feathers of various forms are clearly visible.

As this runs counter to the widespread and long-held

image of dinosaurs as dramatic reptiles, the public has been reluctant to accept this new discovery, especially as the addition of feathers often conjures up the image of a giant chicken. (See 1104: Feathers). Had it been discovered that dinosaurs were in fact covered with 6-inch long razor tipped spikes, people may have accepted this immediately as it conforms to the stereotype of dinosaurs as killing machines.

In the same way, the new information on kings and queens being covered in fabric runs counter to the movie inspired image that the robot on the right had about humans, picturing them as being pink warriors that could grow metal out of their heads. The head-metal image may have been inspired by the discovery of kings and queens buried or entombed with their crowns lying on top of their skulls - for example the Electress Palatine Anna Maria de'Medici. If the robot beings in this comic don't know enough about human anatomy, they may assume that the metal crown is a specialized part of the human skeleton.

Shown at least some evidence pointing to the truth - that humans typically wore clothing, and that a monarch's crown is only a symbol worn atop the head and not part of their body - the robot is predictably disappointed. Humans wearing clothing reduces them, in its opinion, to "big pillows," much like dinosaurs with feathers reduces them from primal beasts to "big chickens." Something made of cloth (or covered in it), at least in this robot's mind, cannot be a significant actor in history.

The robot fails to reason that, among other things, history was what it was, and its wanting things to have been a certain way does not make it so. In addition, just as the clothing-wearing human is more than a mere pillow, and would have held much fearsome power over the world, a feathered dinosaur is not necessarily merely a giant chicken, but is still a powerful killing machine.

The title text references our failure to change the popular image of dinosaurs to reflect the way they truthfully once were. Randall jokingly suggests that we should apply the same "featherless is cooler" logic to popular images of bald eagles (since they are modern dinosaurs), and remove their feathers (only in depictions of them, presumably), leaving them entirely bald. He appears hopeful that such a direct comparison, using the national symbol of the US no less, would provoke the public to change its mind about how dinosaurs are viewed, since modern raptors (birds of prey) are typically viewed with awe and respect, and are not often associated with the "chicken" stereotype mentioned above.

#1528: Vodka

May 22, 2015
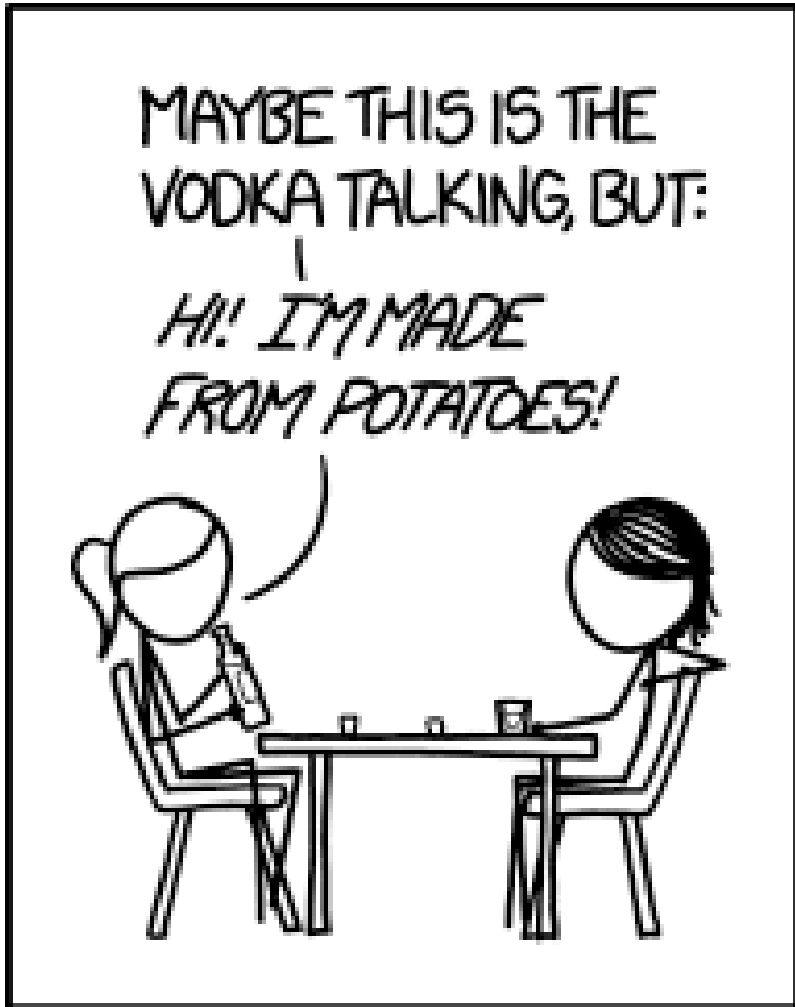
Or whatever's handy! I'm pretty much pure alcohol and water, so it doesn't really matter!

Explanation

Vodka is a distilled beverage composed primarily of water and ethanol, sometimes with traces of impurities and flavorings. Traditionally, vodka is made by the distillation of fermented cereal grains or potatoes, though some modern brands use other substances, such as fruits or sugar.

When people use the phrase "maybe it's the [type of alcohol] talking", they usually mean that they are speaking under the influence of alcohol and are saying things they probably wouldn't say when sober. This is similar to the Latin saying "in vino veritas" - in wine there is truth. However, in this comic, it appears that the vodka itself is literally speaking through Ponytail to discuss its origin, potatoes in this case. Other comics in which things have been taken too literally include 1099: Tuesdays and 1364: Like I'm Five. In 1541: Voice, Ponytail is again possessed by a non-human entity, or maybe she is just making pranks with Megan in both cases.

In the title text, the vodka is implying it can be made from many other things beside potatoes. Vodka can be manufactured from potatoes, grain, and most other plants. Most illegal distilled vodka is often made with whatever one has on hand. However, vodkas are often repeatedly distilled to remove the "foreshots" (the first few ounces of alcohol that drip from the condenser), the "heads" (the higher alcohols which are first to condense

during distillation) and the "tails" (the lower fusel oils which are last to be distilled). Removal of these leaves a clear solution consisting almost entirely of ethanol and water. This is in contrast to other distilled beverages like whiskey, brandy and rum.

#1529: Bracket

May 25, 2015

LOUIS ARMSTRONG
NEIL ARMSTRONG
LANCE ARMSTRONG
STRETCH ARMSTRONG

JEFF GORDON
JEFF BRIDGES
JEFF DANIELS
JACK DANIELS

ORSON WELLES
H.G. WELLS
GEORGE ORWELL
WELLS FARGO

KURT RUSSELL
RUSSELL BRAND
RUSSELL CROWE
RUSSELL SIMMONS
RICHARD SIMMONS
GENE SIMMONS
GENE HACKMAN
HUGH JACKMAN
ALAN RICKMAN
ALAN PARSONS
ALAN PARTRIDGE

JENNY MCCARTHY
JOSEPH MCCARTHY
EUGENE MCCARTHY
EUGENE V. DEBS
GENE WILDER
OLIVIA WILDE
OSCAR WILDE
OSCAR DE LA RENTA
OSCAR DE LA HOYA

JACK NICKLAUS
JACK NICHOLSON
PHIL MICKELSON
NICHOLAS NICKLEBY

RYAN ADAMS
BRYAN ADAMS
CHUBBY CHECKER
FATS DOMINO

COLIN FIRTH
COLIN FARRELL
WILL FERRELL
THE FARRELLY BROTHERS

JOSEPH GORDON-LEVITT
JENNIFER LOVE HEWITT

DANNY GLOVER
DONALD GLOVER
DONNIE WAHLBERG
MARK WAHLBERG
MARK RUFFALO
MARK SHUTTLEWORTH

PHILIP PULLMAN
BILL PULLMAN
BILL PAXTON
BILL MURRAY
DAN AYKROYD

GINGER ROGERS
MISTER/FRED ASTAIRE/ROGERS
MISTER SPOCK
DOCTOR SPOCK
DOCTOR OCTOPUS
DOCTOR MANHATTAN
DOCTOR STRANGELOVE
DOCTOR STRANGE
DR. NO
THE DOCTOR
CORY DOCTOROW

JERRY LEE LEWIS
JERRY LEWIS
JENNY LEWIS
XENI JARDIN

CHRIS EVANS
CHRIS HEMSWORTH
CHRIS PINE
CHRIS PRATT

SHALLOTS
SCALLOPS
SCALLIONS

SIOUXSIE SIOUX
SUZANNE VEGA

TOM ARNOLD
ARNOLD PALMER
AMANDA PALMER

WES CRAVEN
WES ANDERSON
PAUL THOMAS ANDERSON
POUL ANDERSON

SIR WALTER SCOTT
SIR WALTER RALEIGH
SIR FRANCIS DRAKE
FRANK DRAKE

VAN HALEN
VAN MORRISON
VAN WILDER
ROBERT VAN WINKLE
RIP VAN WINKLE
RIP TORN
NATALIE IMBRUGLIA

THE BODY SHOP
BATH AND BODY WORKS
BED BATH AND BEYOND
BEYOND THUNDERDOME
BEYONCÉ

I'm staring at the "doctor" section, and I can't help but feel like I've forgotten someone.

Explanation

A tournament bracket shows the planned series of matchups in a tournament. In this comic Randall has shown a plan for a tournament between a wide range of cultural icons, both real and fictional, based mostly on similarities in their names. Various Internet groups have speculated on who would win in a fight between characters from different films. It may be relevant that the film Batman v Superman: Dawn of Justice was soon to be released at the time the comic was made where the two eponymous superheroes, Batman and Superman, fight against each other.

The individual starting pairings are generally based on common or similar given names or surnames. Some adjacent brackets are "segued" by someone like Jeff Daniels, who segues from a bracket of "Jeff"s into a bracket of "Daniels"es. The bracket itself is fairly arbitrary. Most initial matchups are pairs, although several are trios and there's a quadruplet in the Russels group, while a single entry, Beyoncé, is given a first- and second-round bye. Most of the participants in the tournament are people, with a few exceptions. Shallots (small onions), scallops (bivalve mollusks), and scallions (green onions) are similar sounding foods, therefore may be confusing for some individuals (perhaps including Randall). The final grouping on the lower right of the bracket features several retail stores and a film.

The title text may be a reference to Dr. Dre's 2001 song

"Forgot About Dre" or could simply be a reference to the large number of pop culture personas that include the word "Doctor", such as Doctor House, Dr. Oz, Dr. Eggman, Dr. Phil, Dr. Watson, "Doc" Brown, Dr. Seuss, Dr Pepper, Doctor Doom, Dr. Zoidberg, Dr. Horrible's Sing-Along Blog and many others. A simpler explanation is that it would cause the reader to question "Doctor Who?" answering their own question, although this answer would be incorrect because The Doctor is already present. It could also be a reference to the dual meaning of "The Doctor," either he meant to include Time Lord from Doctor Who and forgot about the EMH from Voyager, or he remembered the EMH and forgot the Time Lord.

The incentive for the comic may have been the French Open 2015, which started on the day of the publication. The comic inspired several groups to play out versions of the bracket. One user-voting based match-up on twitter, XKCD Bracket, was featured by Randall on the xkcd home page, with a link at the top of the website, although he didn't create the account. (The link was part of a "news" flash, the other was regarding his book based on 1133: Up Goer Five. See more on this news in that comics explanation.) In the final match on July 29, Neil Armstrong defeated Mister Spock (see the complete bracket). The link was removed sometimes before Monday, 10 August 2015, within two weeks of the final result being revealed.

Later, Randall has made one smaller but similar bracket in 1819: Sweet 16, and then an interactive April fools'

comics in 2019, with an even larger bracket for determining the best emoji in 2131: Emojidome. The bracket for this comic was shown with links from the comic during the matches. Shallots, scallops, and scallions were also mentioned together in 2372: Dialect Quiz. Randall would later release another comic that juxtaposed similar-looking names, 1970: Name Dominoes.

Table of the bracket[edit]

The names and other entries in the bracket are given here below, sorted to explain why the individual entries have been grouped as they are. The first-round matchups are grouped by shading.

#1530: Keyboard Mash

May 27, 2015

WHY DON'T YOU COME HANG OUT INSIDE MY HOUSE. WE CAN COOK BREAD AND CHAT ABOUT OUR INTERNAL SKELETONS.

Explanation

Cueball is chatting with White Hat, who says he is frustrated because a barking dog is preventing him from sleeping and White Hat mashes the keyboard to show his frustration. Keyboard mashing is often used in this way where the user makes their hands spasm across the keyboard, creating a line of text that can be compared to an angry groan in real life. Cueball is about to give some advice, but is confused by a quirk in what White Hat typed. All the characters he typed (except one) were on the home row of the QWERTY keyboard, the row starting with the letters A, S, D, and F, in the middle of the keyboard. The letters A, S, D, F, J, K, and L (all from the home row) are scattered throughout the text, but there is a 7 (which comes from the numbers row, on top of the keyboard) in the middle of this text. Cueball, wonders how White Hat put a seven in there, because if White Hat was keyboard mashing and touched the 7 key, he likely would have hit any of the QWERTY row keys because of keyboard mashing hand spasms, but he didn't. All the other characters were on the home row. White Hat berates Cueball for always focusing on strange, tiny details. When the final panel shows what's going on where White Hat is, we see that a giant spider has imprisoned him in a web and is talking to Cueball, which explains how the keyboard mashing "White Hat" did was strange.

The reason the dog was barking appears to be because the giant spider was lurking nearby. Little did White Hat

know that the dog was alerting him of the spider. When the spider notices that White Hat mentions the barking dog to Cueball, the spider apparently restrains White Hat and takes over typing. Another possibility is that the "dog" barking is actually White Hat, as he is seen making grunts from beneath the spider's silk. It can be seen in the last panel that the spider is typing with 3 legs, which explains how the 7 key would have been pressed.

The statement "I am a normal human typing with my human hands" is attemptedly an oddly specific assertion from the giant spider that it is actually a human, a claim that would normally be taken for granted and had not really been cast into doubt by Cueball's inquiries about how "7" got into a string of home-row keystrokes.

The title text invitation ends with a similar statement, suggesting that they "...CHAT ABOUT OUR INTERNAL SKELETONS", which spiders (unlike humans) do not possess and which are not a common conversation point among humans, helping to demonstrate (along with the spider's suspiciously specific denial and using the phrase cook bread instead of bake bread) that the spider is not very good at blending in as a human. This implies that the spider also wants to trap and possibly eat Cueball as well, or actually hang out with him in an attempt to make friends or to find out how humans talk so the spider will be able to blend in better in the future. "...HANG OUT INSIDE MY HOUSE" may also have a double meaning, as White Hat and the spider are actually "hanging" from the ceiling inside White Hat's house. Also another oddity is that the

spider asks Cueball to cook bread, although bread is actually baked, and in any case this isn't a common pastime during the night (the spider could also mean make toast). The final oddity is that the title text is written in all caps which is usually interpreted as shouting and would not be used in a casual invitation, although the title text should just be imitating the fact that the rest of the text messages use a font that make them look like they are in all caps.

The central theme of the comic is a vindication of Cueball's world-view, wherein tiny oddities such as the appearance of a numeral in a keyboard mash merit investigation. In the real world, the appearance of a "7" in the middle of a home row keyboard mash is more likely attributable to key ghosting.

Alternatively, the fact that Cueball uses the phrase "all your hands" instead of "both your hands" or "both of your hands" could indicate that Cueball (and likely other people as part of a coordinated uprising of giant spiders) has also been taken hostage by a spider, and the spider behind Cueball's profile picture knows that the organism behind White Hat's profile picture is a spider, not a human. This would also explain why the spider behind White Hat's profile picture feels that the spider behind Cueball's profile picture pointing out the usage of a numeral among home row keys is weird; spiders know that other spiders have many legs and that these legs do not have to be in the same section of the keyboard.

In the title text of 1541: Voice there is again a reference

to a sentence that could be uttered correctly by a human, but would never be used in real life. But a non-human entity that tries to blend in as a human, may inadvertently use such a "wrong" sentence to try to ensure other people think they are indeed humans. It is a direct reference to the type of sentence used in the title text here.

This comic is somewhat unusual in that the panels are read from top to bottom instead of being read from left to right in more than one row. This may be in order to accommodate the second panel, which must be tall due to containing a text conversation, without making the comic look weird due to the second panel being much taller than the first panel.

#1531: The BDLPSWDKS Effect

May 29, 2015

THE BERNOULLI-DOPPLER-LEIDENFROST-PELTZMAN-SAPIR-WHORF-DUNNING-KRUGER-STROOP EFFECT STATES THAT IF A SPEEDING FIRE TRUCK LIFTS OFF AND HURTLES TOWARD YOU ON A LAYER OF SUPERHEATED GAS, YOU'LL DIVE OUT OF THE WAY FASTER IF THE DRIVER SCREAMS *"RED!"* IN A *NON*-TONAL LANGUAGE THAT *HAS* A WORD FOR "FIREFIGHTER" THAN IF THEY SCREAM *"GREEN!"* IN A *TONAL* LANGUAGE WITH *NO* WORD FOR "FIREFIGHTER" WHICH YOU *THINK* YOU'RE FLUENT IN BUT *AREN'T.*
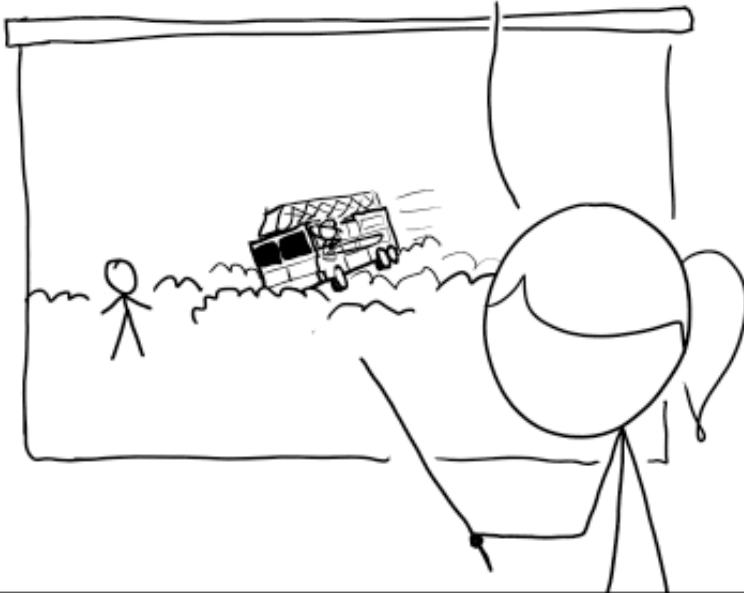
This well-known effect has of course been replicated in countless experiments.

Explanation

The BDLPSWDKS Effect in the title is an acronym for Bernoulli-Doppler-Leidenfrost-Peltzman-Sapir-Whorf-Dunning-Kruger-Stroop Effect, as explained by Ponytail in the comic. She stands in front of a slide that shows Cueball being subjected to this effect.

The effect mentioned appears to be a mashup of seven scientific principles (with nine scientists' names included) from physics and social sciences, with elements from each principle appearing in the resulting description of the effect:

- Bernoulli's principle in fluid dynamics (also mentioned in 803: Airfoil) states that an increase in the speed of a fluid with certain properties occurs simultaneously with a decrease in pressure or a decrease in the fluid's potential energy.

  This is referenced by the firetruck lifting off and hurtling.

- The Doppler effect in physics refers to the change in a wave's frequency for an observer moving relative to its source. Sound from the oncoming firetruck increases in pitch.

This is referenced by Cueball reacting faster if the shouting is in a non-tonal language than a tonal language. In tonal languages, changes in pitch change the meaning, thus tonal languages may suffer more from Doppler

distortion than non-tonal ones. Additionally, the choice of firetruck was likely influenced by this effect, as a firetruck and its siren are often invoked as an example of it.

This may also be referenced by the fact that Cueball reacts faster when red is shouted as the Doppler effect makes light shift up the spectrum : red may still be visible after the shift but green may be out of the visible range.

• The Leidenfrost effect, in physics, refers to how liquid will produce an insulating vapor layer when in near contact with an extremely hot surface, causing it to hover over said surface.

This is referenced by the firetruck lifting off on a layer of superheated gas.

• The Peltzman effect, in behavioral economics, refers to how regulations intended to increase safety are ineffective or counterproductive because people, feeling safer, will engage in riskier behaviours.

This is referenced by the fire truck, which is intended to improve public safety by putting out fires, speeding and thus creating a hazardous situation and reducing the safety of the pedestrian. The firefighter may also be more inclined to drive recklessly due to the feeling of safety they have in a modern firetruck.

• The Sapir–Whorf hypothesis, in linguistics, states that a person's world view and cognitive processes are affected by the structure of the language the person speaks.

This is referenced by languages with a word for "firefighter" giving a quicker reaction. If Cueball speaks (or is currently thinking in) a language without a word for "firefighter", he might be slower to recognize the role and authority of the driver warning him, and thus slower to react to the danger.

- The Dunning–Kruger effect, in social psychology, refers to unskilled people mistakenly perceiving themselves as more skilled than they really are, while skilled people underestimate their own abilities.

This is referenced by the tonal language being a language Cueball thinks he is fluent in but isn't.

- The Stroop effect, in psychology, refers to the phenomenon in which it is easier to name the color of the ink in which a word is written when the word refers to the same color as the ink than when the word refers to a different color.

This is referenced by Cueball diving out faster if the driver screams "red!" than if the driver screams "green!", as a traditional American firetruck is red, and therefore it may create a moment of confusion for Cueball if the driver shouts "green!". It may also reference the common usage of "red" as indicating fire or danger, while "green" indicates safety.

This comic is probably a comment on the "replication crisis" in social psychology which has been in the news recently. For example, studies finding that merely

thinking about intelligent people (e.g., writing down the attributes of a professor) will actually improve performance on math tests were once widely believed, and this "intelligence priming" effect is even included in textbooks. However, recent attempts to reproduce these effects have mostly failed and this failure to replicate is true of many social priming effects as well as other experiments in social psychology. Randall is also mocking the complicated, or even convoluted, setups often used in these experiments.

Usually, for an effect to be considered real, the scientific method requires the effect to be replicated by different experimenters in different times and places. It is hard to imagine several scientists in different parts of the world creating the setup to replicate this effect; however the title text mentions, sarcastically, that it has been done countless times.

Many other xkcd strips have commented on the ease with which surprising and novel, but false, results can be published in the scientific literature, such as 1478: P-Values and 882: Significant.

#1532: New Horizons

June 01, 2015
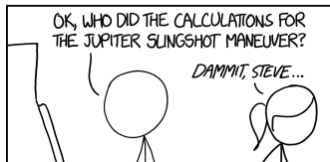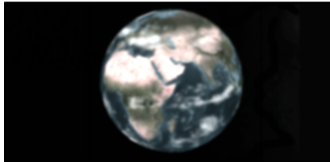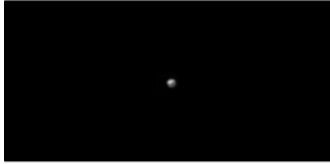
Last-minute course change: Let's see if we can hit Steve's house.

Explanation

New Horizons is a NASA mission launched in 2006 to study the dwarf planet Pluto and its moons. Its closest approach to Pluto was on July 14, 2015 (NASA countdown clock), six weeks after the publication of this comic. In April and May 2015, it captured the first images of Pluto with enough resolution to see some details on Pluto's surface (NASA photos from 12 April to 12 May). These images are similar to the second panel of the comic, with Pluto shown as a gray dot only a few pixels wide.

Dawn is a NASA mission launched in September 2007 to study the asteroid Vesta and dwarf planet Ceres. Its closest approach to Vesta began on July 16, 2011 by the Vesta approach, and entered orbit around Ceres on 6 March 2015. And in fact the pictures of Ceres are still in a much better resolution like in this comic 1476: Ceres, but these images are also still mysterious.

On the day this comic was published, New Horizons was at 0.34 AU from Pluto and 32.55 AU from the Sun (Johns Hopkins University's New Horizons page). One Astronomical unit (AU) is the approximate distance of Earth from the Sun, or about 150 million kilometers.

Distances from the Sun by semi-major axis: Vesta 2.36 AU; Ceres 2.77 AU; Jupiter 5.20 AU; Pluto 39.26 AU.

A slingshot maneuver is a technique where a spacecraft is maneuvered or accelerated with the help of a

gravitational field. In the comic, presumably someone named Steve made the calculations for the New Horizons spacecraft to accelerate toward Pluto using Jupiter's gravity.

In the first panel we see Cueball and Ponytail standing in front of a computer monitor and observing a series of images sent back from New Horizons as it approaches the planet. They are about to see the dwarf planet Pluto with the highest resolution ever.

As the spacecraft gets closer, the images return... Earth. Steve had miscalculated the gravity assist and the spacecraft is about to crash into Earth (or closely pass by, as it was planned to do with Pluto).

Because the spacecraft carries 10.9 kg (24 lb) of radioactive plutonium-238, a crash on Earth is extremely dangerous. It was estimated that a worst-case scenario of total dispersal of on-board plutonium during the launch would spread the equivalent radiation of 80% the average annual dosage in North America from background radiation over an area with a radius of 105 km (65 miles) (Draft Environmental Impact Statement for the New Horizons Mission). Because of decay during the flight, the situation would be slightly less dire if it crashed years later, but still a major disaster.

Less importantly,[citation needed] this is a huge embarrassment, especially in front of the successful Dawn team, who were the first to get a probe to visit a dwarf planet. Part of the joke is the utter implausibility

of such an error being made, and then not being detected.

The title text suggests the team is considering crashing the probe into Steve's house as punishment for his errors. However, doing so would expose Steve's neighbors, who almost certainly had no role in this screw-up,[citation needed] to potentially lethal levels of radiation. Therefore, the team would most likely have to crash the probe into an unpopulated area or the sea, to minimize human exposure. Randall described what might happen if New Horizons crashed into one's car in the what if? article New Horizons, and assuming the car was parked in the driveway the house would be similarly affected by the blast.

Luckily this was not what happened and when New Horizons reached Pluto 1½ month later Randall made this tribute to the achievement: 1551: Pluto and the aforementioned what if? article New Horizons.

Randall has used a Steve in a similar context in 809: Los Alamos (set in 1945). If this is the same person, then 'Steve' would be at least 90 years old in 2015. A person named Steve also comes up with an inappropriate suggestion in 1672: Women on 20s.

#1533: Antique Factory

June 03, 2015
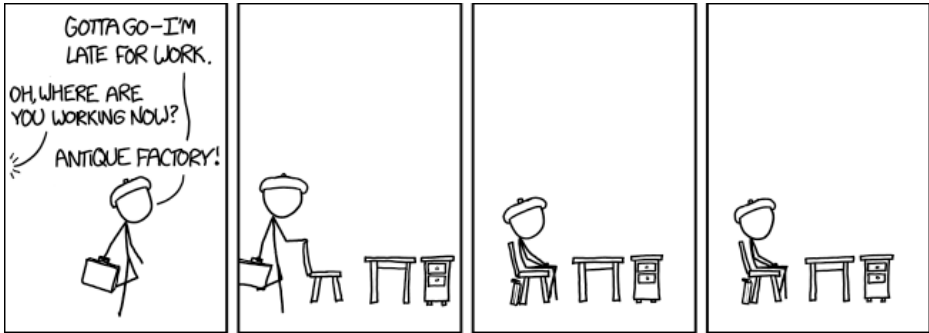
WARNING: This item was aged by the same inexorable passage of time that also processes nuts.

Explanation

Beret Guy has a new job with a paradoxical premise. When asked where he works, he says "Antique factory!" which is an oxymoron since one cannot build an antique object directly in a factory: Only when the item is old enough to be worth more than its original price (and will often have to have been in use during this time period), can it be called an antique. Alternatively, he could simply be referring to the factory as "antique" which may be correct.

At the "factory", Beret Guy walks up to a chair, a table, and a small cabinet, then simply sits down in the chair and does nothing else. Of course, one does not simply make or manufacture antiques - instead, one must wait. Beret Guy appears to be doing exactly this. The implication is that the "antique factory" is simply a place where furniture is stored until it becomes old enough to be considered "antique", and that Beret Guy doesn't perform any useful function (except perhaps using the items to make them look old and worn, or keeping an eye on the inventory so it won't be stolen).

The title text refers to allergy warning labels saying May contain nuts. More specifically, they may say "Manufactured in a facility which also processes nuts", "Manufactured on equipment that also processes nuts", or similar. These warnings indicate that bits of powder and oil from nuts may have been mixed into the product, creating a hazard to people with nut allergies. Sometimes

these warnings are used for allergens besides nuts, but nuts are likely the most common.

The joke here is that of course the time that has passed for a specific item to become an antique will be the same time that has also passed while elsewhere nuts have grown. Thus the time that has inexorably passed to make a specific item antique will also have processed nuts.

Beret Guy has previously "traveled" into the future in 209: Kayak. He has also previously waited for a long amount of time in 1088: Five Years and in 1617: Time Capsule.

#1534: Beer

June 05, 2015
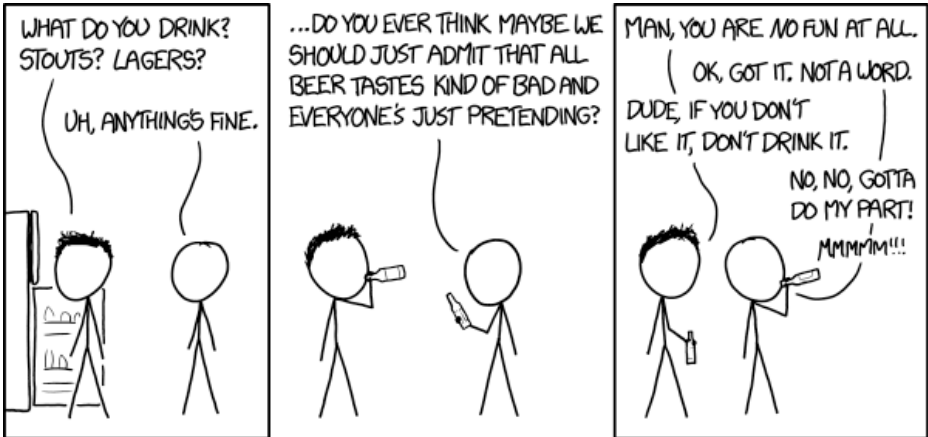
Mmmm, this is such a positive experience! I feel no social pressure to enjoy it at all!

Explanation

Hairy offers Cueball some beer from his fridge, and Cueball takes the opportunity to suggest that people should admit that beer tastes bad and stop pretending to like it. Hairy berates Cueball for making such an admission, and Cueball admits defeat, deciding to drink the beer anyway and pretend to like it to play his part in what he perceives to be a mass delusion.

Beer is made by soaking and fermenting grains in water. This process both produces alcohol, and introduces complex profiles of flavor. However, these flavors are often outside of what naturally appeals to people. As a result, many find beer to be an "acquired taste", meaning that most people don't enjoy it at first, but come to appreciate it with time and experience. There's a large and thriving subculture of beer enthusiasts who have strong opinions on the relative qualities and appeal of different types of beer and different process for producing it.

Cueball appears to see this entire system as something of a mass delusion, in which nobody really likes beer, but "pretend" to like it, out of social expectation, and proposes that everybody simply admit this. When Hairy rejects this suggestion, Cueball passive-aggressively agrees to drop it, while making clear that he's feigning enjoyment out of peer pressure.

There are two possible interpretations of this comic. One

is that Cueball is right and that no one really likes beer, and everyone is just pretending in order to fit in. The other is that Hairy actually likes beer, but Cueball is adamant on this stance and would sarcastically consume alcohol rather then refusing it. In the first interpretation, the comic is a mockery of drinking culture in general, suggesting that people are simply going along with social expectations (which are created by other people going along with the same expectations). In the second interpretation, the comic is a mockery of people who loudly profess their distaste for beer. In support of this point, Hairy is very clear that Cueball shouldn't drink if he doesn't enjoy it, but Cueball drinks anyway, just so he can continue to complain.

The title text expands on Cueball's perspective, stating (sarcastically) that he feels "no peer pressure" to like beer. The pressure to drink beer or other alcoholic drinks is a well-known phenomenon, especially among adolescents and young adults.

A similar point about the effects of peer pressure and culture on drinking is made in 915: Connoisseur.

#1535: Words for Pets

June 08, 2015
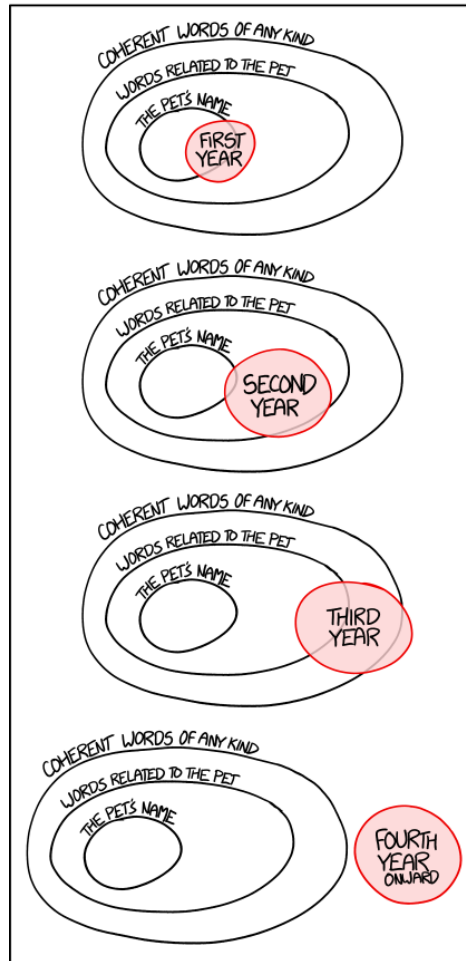
Seventh year: Perfectly coherent words, but in the pet's language, not mine.

Explanation

The comic shows four similar Euler diagrams, one for each of the first four years of living with a pet. The diagrams depict sets of words which have varying efficacy in actually identifying the pet, and each one shows how the words used by Randall to refer to his pet change year by year and becoming less and less specific as time goes on.

In the first year it is dominated by the actual name of the pet or words closely related. For example, a dog named Lassie might be called either "Lassie", "dog", "collie" or "boy/girl".

Moving on to the second year, these related words like "dog" and "collie" get more abundant while the actual name is seldom used. Phrases such as "good dog" or "here, boy" are likely common. Giving a dog the name "Dog" is so common that there is a trope about that.

In the third year, the pet's name is no longer used at all and the owner probably uses simple phrases like "come" or "come here" to call the pet, omitting the name. This is also probably referring to expletives.

The fourth year entails the use of just any sound, not coherent words. This may be referring to something like baby talk, attempted mimicry of the pet's vocalizations, or whatever random sounds the owner has discovered that get a response from the pet.

This development can be attributed to the fact that some animals don't listen to their own name but rather react to the sound of the voice of their owner. It could also refer to the growing bond between owner and the pet, as well as the effect described in 231: Cat Proximity.

The title text suggests that the inevitable result of this continuing pattern is that by the seventh year, Randall will be communicating with the pet in its own language. This might refer to the tendency of some pet owners to mimic or imitate their pets' vocalizations, as if speaking to them. Alternatively, this could be interpreted as a joke that pets don't have proper language and the owner has degenerated to a lack of language themselves as time goes on.

The title text and the caption makes it a little difficult to be certain if the comic refers to when you talk about your pet to other people ("my dog is always hungry") or when you call at it, which would be the only time it would make sense to use coherent words in the animal's own language - "Woof" = come here.

#1536: The Martian

June 10, 2015
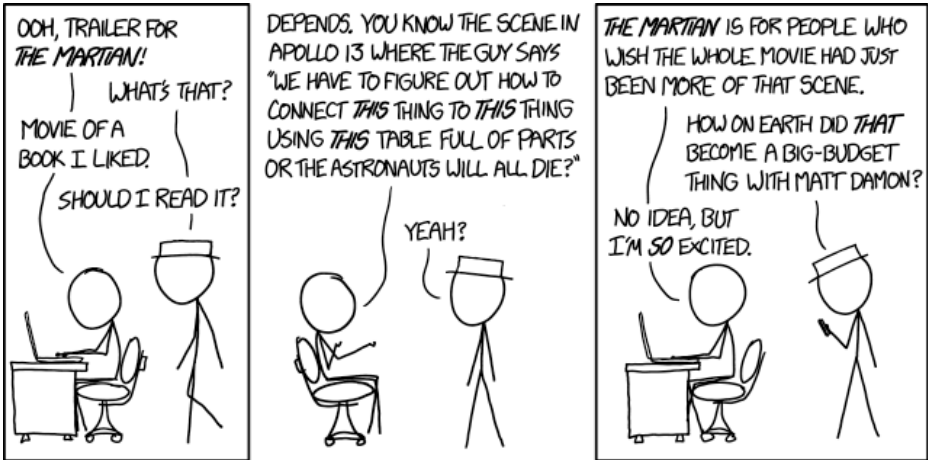
I have never seen a work of fiction so perfectly capture the out-of-nowhere shock of discovering that you've just bricked something important because you didn't pay enough attention to a loose wire.

Explanation

Cueball is very excited about seeing that the trailer for The Martian is finally released, because he really liked the book. Cueball most likely represents Randall himself in this comic. The Martian is a 2015 film based on a 2011 science fiction novel of the same name by Andy Weir. The plot involves an astronaut who's accidentally left on Mars when the rest of his crew has to leave during a disaster. The central plot of the novel involves the protagonist having to improvise ways to survive in such an inhospitable environment until a rescue mission can be mounted.

White Hat is apparently unfamiliar with the book, and Cueball explains it by referencing a scene from another movie. Apollo 13 is a film about an actual event in which a mission to the moon had to be aborted when the ship was damaged en route. In the referenced scene, NASA personnel had to quickly develop a plan to build an improvised adapter for a carbon dioxide scrubber, using only those materials available on the spacecraft. This task was critical to the astronauts' survival, if they had failed, the air in the ship would have soon become unbreathable.

Cueball apparently particularly enjoyed that scene, and suggests that this kind of on-the-fly problem solving in order to survive is the central theme of The Martian, rather than being only a single scene.

In the final panel, White Hat wonders how such a plot was made into a big-budget film starring Matt Damon. Matt Damon is a high-profile star, known for action films like the Bourne series. Blockbuster films with such stars are usually designed to appeal to as broad an audience as possible, to maximize ticket sales, and therefore justify their large budgets. The kind of cerebral, science-heavy problem solving at the core of The Martian tends to appeal to a smaller, nerdier demographic. Cueball appears similarly surprised that the film was made in the first place, but is happy that it was.

On the day the movie was released in the US, Randall went to see it and released this comic about it: 1585: Similarities.

In 2561: Moonfall a similar discussion of an upcoming movie is made for Moonfall. But in that case it is the scientific inaccuracy that is the subject, and the huge explosion that makes it worth seeing anyway... maybe?

#1537: Types

June 12, 2015

MY NEW LANGUAGE IS GREAT, BUT IT
HAS A FEW QUIRKS REGARDING TYPE:

```
[1]>   2 + "2"
  =>   "4"

[2]>   "2" + []
  =>   "[2]"

[3]   (2/0)
  =>  NaN

[4]>  (2/0)+2
  =>   NaP

[5]>   "" + ""
  =>   ' "+" '

[6]>  [1,2,3]+2
  =>  FALSE

[7]>  [1,2,3]+4
  =>  TRUE

[8]>  2/(2-(3/2+1/2))
  =>  NaN.0000000000000013

[9]>   RANGE(" ")
  =>   (' " ', "!", "  ", "!", ' " ')

[10]>  + 2
  =>   12

[11]>  2+2
  =>  DONE

[14]>  RANGE(1,5)
  =>   (1,4,3,4,5)

[13]>  FLOOR(10.5)
  =>  |
  =>  |
  =>  |
  =>  |___10.5___
```

colors.rgb("blue") yields "#0000FF". colors.rgb("yellowish
blue") yields NaN. colors.sort() yields "rainbow"

Explanation

This comic is a series of programming jokes about a ridiculous new programming language, perhaps inspired by Mathematica and Wolfram Language — the latter was used by Randall many times before. Maybe it's also inspired by Gary Bernhardt's CodeMash 2012 lightning talk on JavaScript's unpredictable typing. In the talk, the highly technical audience was unable to correctly guess the results of adding various JavaScript types and roared with laughter when they were revealed. The programming language shown in this comic has types even more unpredictable than JavaScript.

Most regular programming languages distinguish types, e.g. integers, strings, lists... all of which have different behaviours. But for instance, the operation "+" is usually conventionally defined over more than one of these types. Applied to two integers, it returns their sum. Applied to two strings (denoted by being enclosed in quotes) it concatenates them:

While these behaviours are standard, conventional, and intuitive, there is a huge amount of variation among programming languages when you apply an operation like "+" to different types. One logical approach is to always return an error in all cases of type mixing, but it is often practical to allow some case mixing, since it can hugely simplify expressions. Variation and lack of a clearly more intuitive behaviour leads some languages to have weird results when you mix types.

Weird results abound in the new XKCD programming language:

The title text contains three further examples relating to color. color.rgb("blue") returns the hexadecimal code for pure blue (as would be used in HTML, for example), which is how a real programming language might work. The lookup for "yellowish blue" returns "NaN" (Not a Number) again, which makes sense at one level because there is no such color as "yellowish blue" (yellow and blue are opposites on the RGB color triangle, making yellowish-blue an impossible color, which can only be perceived with great difficulty through contrived figures). However a more typical result would have been a failure indicating that the color database does not include the name, in the same way that a typo such as "bluw" would. (Note that HTML does explicitly attempt to handle all "color names", though unrecognized ones like "yellowish blue" just interprets them as numbers (with zeros replacing invalid hexadecimal digits). For the record, "yellowish blue" is a dark blue with an imperceptible amount of red — #0E00B0.) Similarly sorting the colors would normally produce some defined ordering, such as alphabetical, but in this language it generates the string "rainbow". It seems that Randall's new language understands color theory in an unusually deep way.
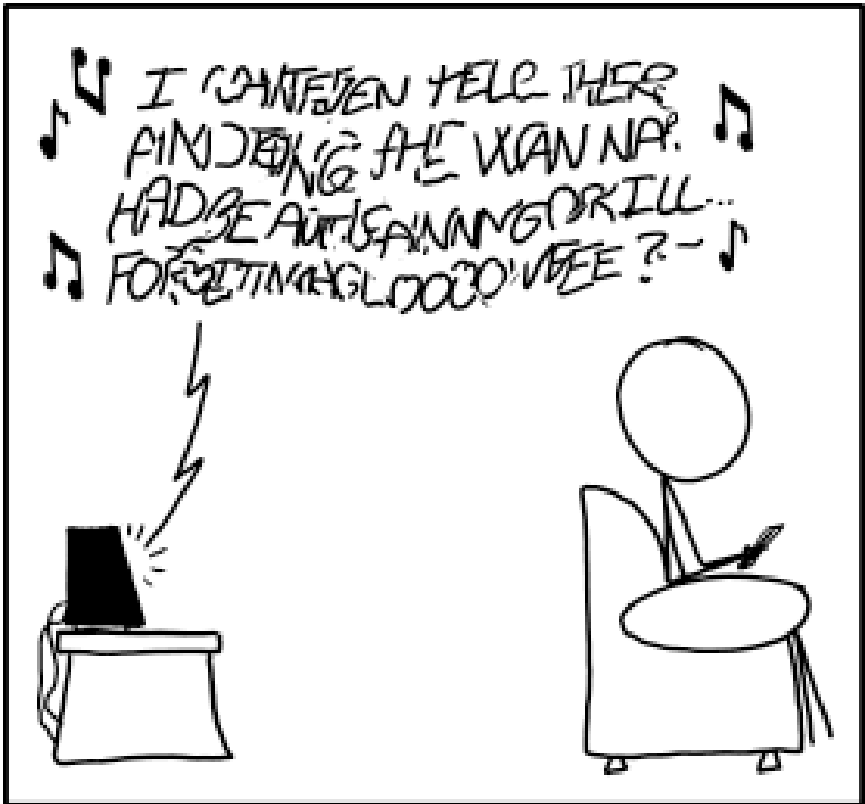
SOMETIMES I WONDER WHAT IT WOULD BE LIKE TO BE ABLE TO UNDERSTAND SONG LYRICS WITHOUT LOOKING THEM UP.

To me, trying to understand song lyrics feels like when I see text in a dream but it hd t ed ad cant fcu

Explanation

For some modern songs, the vocalist chooses to perform the track in a way that emphasizes emotion, accent or style over clear pronunciation of the lyrics. Some forms of music, for example the Jazz style Scat, use purely nonsensical lyrics while some styles of dance music use a single line of lyrics repeated throughout the track.

There are also certain types of people that may describe themselves as "lyric deaf", which is sort of the lyrical equivalent to being tone deaf, although it doesn't have an underlying medical understanding. Some people that describe themselves as tone deaf are even quite musically capable.

The comic is illustrating (in text form) how listening to such a song feels before you have learned what the actual lyrics are. The lyrics are represented in an indecipherable way, with a few mildly recognizable words. This represents the auditory experience of being able to hear and understand some words (perhaps incorrectly), but not all of them.

Another example of this experience can be seen in this British TV commercial from the 1980s, showing someone who has misheard Desmond Dekker song Israelites so for instance the line Poor me Israelites becomes Oh-oh my ears are alight. See more details in the trivia section.

This experience is similar to that shown by the character Havelock Vetinari the Patrician of Ankh-Morpork, in Terry Pratchett's Discworld book Soul Music (see part of book here). Rather than listening to music, he preferred to read the printed sheet music:

For a related experience see Mondegreen.

The title text elaborates on the fact that Randall has the same experience when trying to understand song lyrics as when he sees text in his dreams. The last part of the title text is written in strange scripts to illustrate how he feels when seeing text in his dreams. Translated it says: it's hard to read and I can't focus.

Note that it looks like the song lyrics were written by drawing in a tool, like MS Paint, and then cutting out pieces and shifting them slightly.

Possible lyrics and songs[edit]

The closest guess on the lyrics is this:

(Note that the first line also might be I can't even help her.)

It is very likely that Randall completely made up these lyrics himself and if any song coincidentally share some part of them it only happens because Randall has chosen some very cliché lyrics, that would thus be likely to occur in some pop songs.

Nevertheless, here below are some possible song references, in which the exact line from above occurs:

• If the first line is I can't even tell her, it could come from

- If the first line is I can't even help her, it could come from:

- The second line Anything she wanna could be from:

- The third line Had to be outstanding or kill (which is basically just a simple guess at what could be said in the line) does not make much sense and there are no songs that include such a line.

- The fourth line Forgetting love could come from:

Or we've been nerd sniped.

#1539: Planning

June 17, 2015
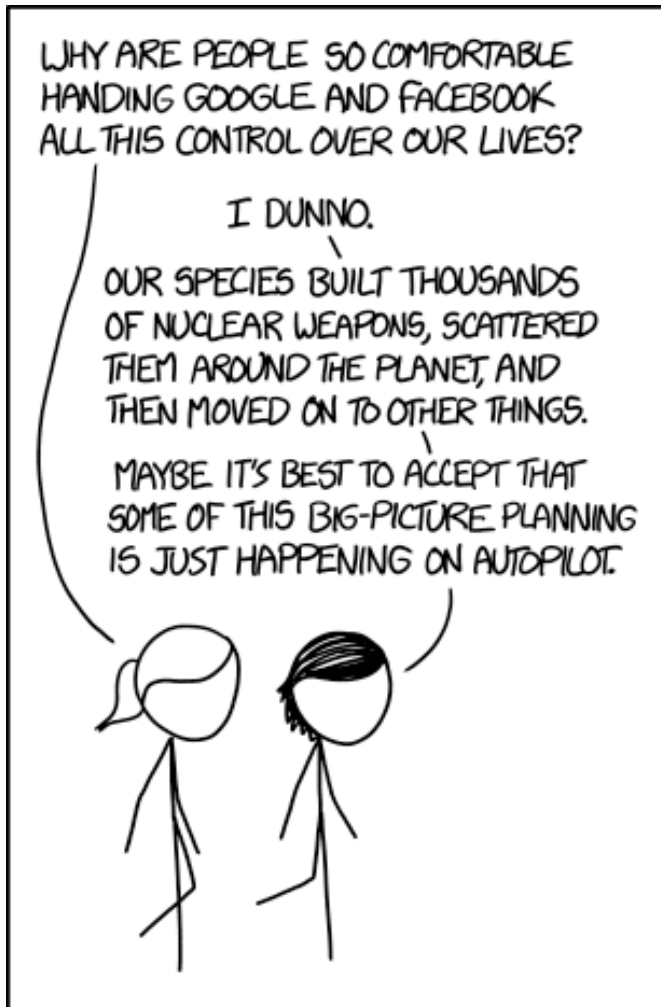
[10 years later] Man, why are people so comfortable handing Google and Facebook control over our nuclear weapons?

Explanation

Big companies have always tried to get the greatest amount of information from their customers, because that translates into more money earned. However, ability to gather, store and process such information is limited by the technology available. With the recent development of computers, this ability has grown far more than anyone could have suspected just 20 years ago; to the point that companies like Google or Facebook get almost unimaginable amounts of data from their users; and this data is gathered and stored automatically and can be efficiently accessed.

This data is routinely used to, for example, tailor online ads to the browsing history of the user seeing the ad. They could potentially be used for more evil purposes, like selling the medical history of users to insurance companies. Many users don't feel that they're giving out so much information, and in fact that few of them have given Google or Facebook their medical history. However some leaks have proven quite the opposite. In the AOL leak referenced in 155: Search History, searches for "how does a male's cocaine use affect a fetus", "hysterectomy" or "8 alcohol drinks a day", surely would be interesting for a medical insurance company to know.

In the comic, Ponytail is puzzled because people are not worried about Google or Facebook using their information in evil ways; however Megan raises a quite fair point, namely that the huge amount of nuclear

weapons in existence is much scarier, and that was worrying to the general public in the 1980s, however people have grown tired of that and now concerns have moved to internet privacy only because it's "new". What is perceived as dangerous or worrying follows trends and fashions not directly related to real danger (i.e. "happen on auto-pilot"). The point Megan is making is that maybe it's better to just accept that things work in this way and go with the flow. This is very similar to what happens in 1480: Super Bowl or 1534: Beer.

The title text hypothesizes a similar conversation being held ten years later (presumably in 2025, ten years after the comic was published), in which the two aspects of the above have been inexplicably mixed. A future equivalent to Ponytail asks why we all think it is OK to hand over the control of our nuclear weapons to Google and Facebook, which would certainly be a nonsensical (and deeply troubling) route to take. This could also be seen as another step toward the singularity, from which perspective handing over control of nuclear weapons could be desirable, catastrophic, implicit and/or unavoidable.

This comic was posted on the day after Vladimir Putin had announced that Russia would add 40 new intercontinental ballistic missiles to its nuclear stockpile within the year.

Within a year Randall has made several other comics about nuclear weapons, the first of these, 1520: Degree-Off, came just 1½ month before this one. Later

these two comics were released early in 2016: 1626: Judgment Day and 1655: Doomsday Clock. Nuclear weapons are also mentioned twice in Thing Explainer, specifically they are explained in the explanation for Machine for burning cities about thermonuclear bombs, but they are also mentioned in Boat that goes under the sea about a submarine that carries nukes. All three comics and both explanations in the book, does like this comic, comment on how crazy it is that we have created enough firepower to obliterate Earth several times (or at least scourge it for any human life) [citation needed]. Google and Facebook are not the only unlikely organizations Randall has imagined could become military powers-in the title text to 1953: The History of Unicode he imagined the Unicode Consortium apparently taking over arbitrating world peace from the United Nations.

#1540: Hemingway

June 19, 2015

HEMINGWAY'S ROUGH DRAFTS

FOR SALE: THIS GULLIBLE BABY'S SHOES

BABY SHOES FOR SALE BY OWNER

~~ACTUALLY, THERE'S NO EVIDENCE HEMINGWAY WROTE~~

FREE SHOES, PROVIDED YOU OVERPOWER BABY

FOR SALE: WEIRD BABY'S TOE SHOES

FOR SALE: BABY SHOES ✓*Prime* ELIGIBLE

~~THOUGH POPULARLY ATTRIBUTED TO HEMINGWAY, THE~~

THIS WEIRD TRICK COVERS BABY FEET!

FOR SALE: BABY SHOES, JUST HATCHED

SALE: SEVEN-LEAGUE BOOTS (EXPEDITED SHIPPING)

COMPLETE THIS SURVEY FOR FREE SHOES!

SHOES, BY ERNEST HEMINGWAY [citation needed]

THIS IS MY GREATEST SHORT STORY.

FOR SALE: BABY SHOES (-1) [CURSED]

<BLINK><MARQUEE>BABY SHOES!</MARQUEE></BLINK>

FOR SALE: BABY-SIZED SADDLE, BOBCAT

HEMINGWAY BUSTED FOR CRAIGSLIST SHOE SCAM

Instead of bobcat, package contained chair.

Explanation

This comic is a reference to the six-word short story For sale: baby shoes, never worn, which has been commonly attributed to famous author Ernest Hemingway (the disputed authorship of the story is referenced several times in the comic).

The comic plays on the fact that the original story takes the form of a short advertisement that might have been seen in a newspaper, and makes up alternate versions that use various modern 'standards' that did not exist in Hemingway's time. In keeping with the original, each example remains six words long. The title text obeys this rule, too. Many of the drafts poke fun at the tragedy that the original story suggests. With the original ("For Sale: Baby shoes, never worn"), readers could infer that the baby who would have worn the shoes must have died. Randall tries to make the reader infer other, more absurd things instead.

The comic also alludes to Hemingway's practice of repeatedly re-working drafts of his novels before publication. For example, he is reported to have rewritten the final passage of A Farewell To Arms 39 times. Later editions of his works include these rough drafts, allowing the devoted reader to understand how the work developed.

The following are the various drafts offered in the comic.

The title text continues the reference to 325: A-Minus-Minus, but inverts the situation. Rather than unexpectedly receiving a bobcat by package, this time the package contains a regular item instead of the expected bobcat. In keeping with the theme of the comic, the review is written in only six words.
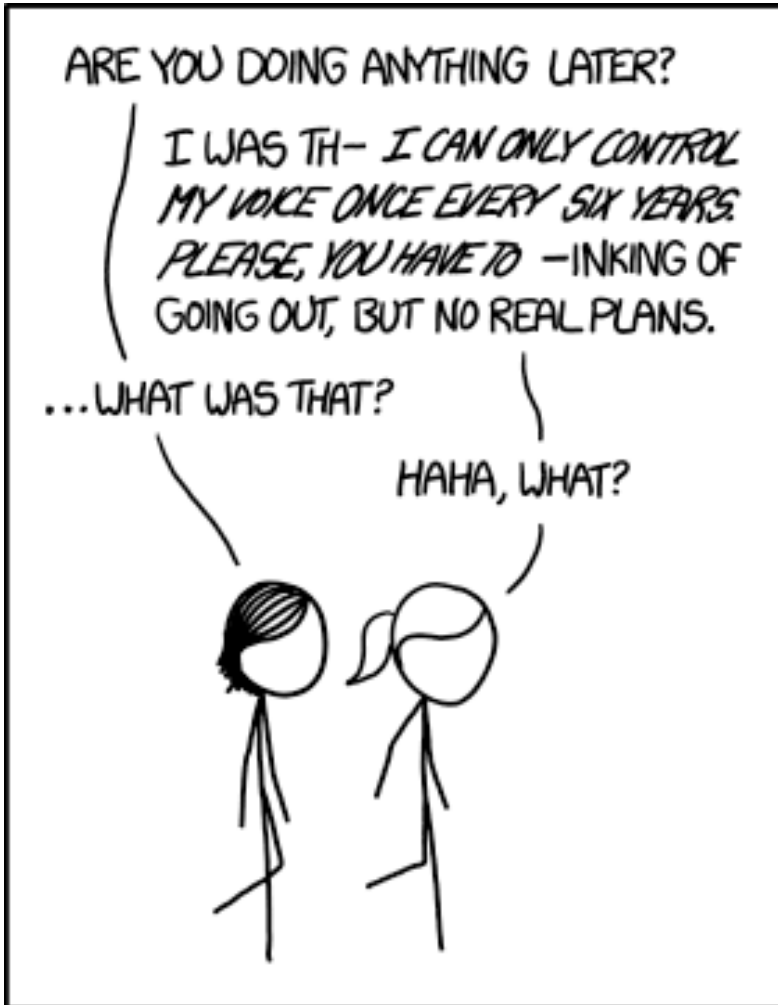
Anyway, we should totally go watch a video story or put some food in our normal mouths!

Explanation

During a casual talk with Megan, Ponytail suddenly interrupts her normal speech stating that she is for some reason only capable of controlling her own voice once every six years. Apparently only for a very brief time since she immediately returns to the casual talk, continuing her previous sentence mid-word before being able to tell Megan how she could help her. Upon Megan's confused request, she denies knowledge of the occurrence, although in a somewhat suspicious way, using possibly fake laughter.

It could be this was just a prank by Ponytail, to tease Megan, but given her fake laughter reply to Megan's inquiry and the continuing comment in the title text it seems most likely that Ponytail is indeed possessed by some sort of entity that prevents her from expressing her own thoughts, except for a very short time every six years. Of course this may just be her way of continuing with the prank; see a previous case of such a prank below.

In case it is not a prank it would thus appear that Ponytail's usual "self" is indeed this possessing entity. Whether this entity is actually aware that the "real" Ponytail did speak, or if it actually does not know that it was interrupted (since it continued mid-word) is not clear from the last response to Megan.

The title text suggests that Ponytail is possessed by some sort of inhuman entity (most likely an alien or AI, or

possibly a small but intelligent creature living in her head) unfamiliar with movies and eating. See below for related comics.

Related comics[edit]

The comic, 1530: Keyboard Mash, also revolves around the same theme of a non-human entity trying to convince other humans that it is in fact a human. This is most clearly referenced in the title text of this comic. In Keyboard Mash, it is a spider that tries to chat like it was a human, making statements that are true if you are human, but which humans would never utter in a conversation like here - put some food in our normal mouths! However, the pretended 'human' being (the spider) is not seen by the other person in this comic. As opposed to this one where Megan speaks directly with Ponytail.

It has already been established recently, in 1528: Vodka, that Ponytail's voice can be hijacked by non-human entities. That time it was the vodka she was drinking that took over. It is possible that this is continuing or caused by the same openness to possession as shown here. It is also possible that she simply thinks possession jokes are funny and once again jokes with Megan.

Six years to the day before this one, which according to this comic was the last time Ponytail had control of her own voice, this comic 600: Android Boyfriend was posted. Ponytail acquired an android boyfriend. It seems unlikely that this older comic has any relation with this particular episode - except that this comic mentions a six-year period and Ponytail is also in that comic.

Ponytail is mainly a filler character, showing up when two females are needed or when a large group of people are present.

It is important to note that Ponytail, like most xkcd stick figures, usually does not represent the same character in each comic. This Ponytail is likely unrelated to other instances of Ponytail.

#1542: Scheduling Conflict

June 24, 2015
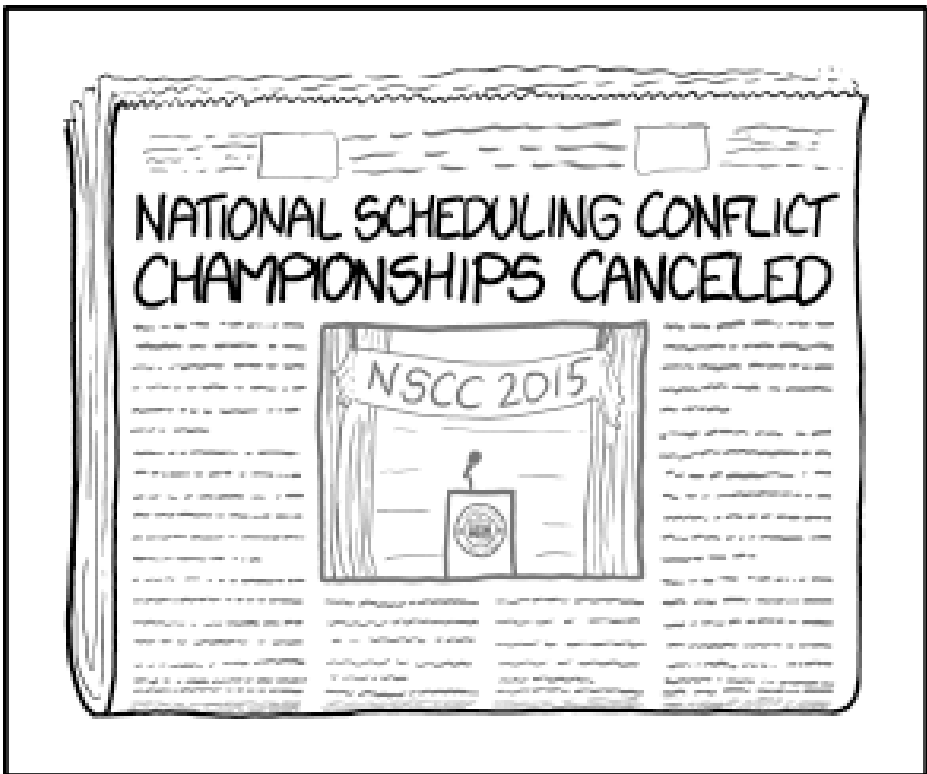
Neither a spokesperson for the organization nor the current world champion could be reached for comment.

Explanation

There are two humorous features in this comic:

The comic shows a newspaper with a large headline:

Many readers naturally see a phrase break between the two lines, so that it means "there has been a scheduling conflict on a national scale, which has caused championships to be cancelled" (what the conflicts are, and which championships have been cancelled, is not made clear).

However, the correct interpretation is implied by the picture of an empty lectern under a banner with the text NSCC 2015. The headline should be read like this:

This comic thus envisions a "National Scheduling Conflict Championship" (NSCC), presumably as the culmination of some larger scheduling-conflict competition. It is unclear if the goal of the event is to have a scheduling conflict and miss it, or if there are actual challenges at the event, but this year's event has been canceled, most likely due to scheduling conflicts. Whether it is the contestants that miss the event, as it's their nature to always have a scheduling conflict, or if it is the organizers that have an issue is untold. The question is whether the event's cancellation is a success in itself or just a predictable failure of such an event.

The comic could also refer to the very common political ploy of using a "scheduling conflict" as an excuse to miss

an event where the politician expects to be challenged or questioned on an issue he wishes to avoid. This is so frequent that it has become a cliché in American politics.

The abbreviation NSCC is related to many other national sports organizations like NFL and NBA. (The most common use of it online seems to be for Nova Scotia Community College).

The title text mentions that is was impossible to reach either a spokesperson for the organization (NSCC) or last year's world-champ (winner of the WSCC) for a comment. Thus continuing the problem with schedules for people involved in this type of championship. The world-champion could be assumed to be able to comment in this national championship (probably the American championship given that Randall is American), since the paper is looking for a comment on the national championship. But this proves that at least a world champion was crowned last year, so this type of competition is not always canceled.

It is not a necessity for a spokesperson for a sports organization to be good at the sport in question. However it will often be former competitors within the sport or at least people with interest in this kind of activity that takes an interest in such an organization, thus making it likely that they would also be good (or like to think they are good) at achieving scheduling conflicts.

A similar type of competition was mentioned earlier in 1466: Phone Checking in which it was difficult to load

the web page with the result of the competition because it was overloaded by all those compulsive phone-checkers that have an interest in such a contest. They continually try to reload the home page of the CPCC (i.e. compulsive phone-checking championship) making the web page go down.

#1543: Team Effort

June 26, 2015
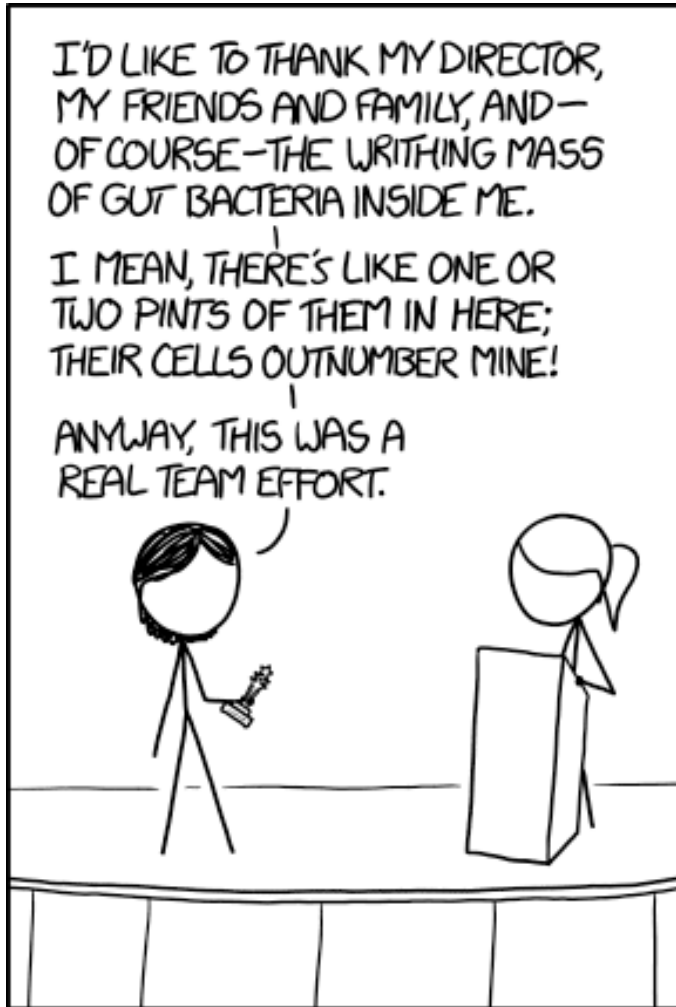
Given the role they play in every process in my body, really, they deserve this award more than me. Just gotta figure out how to give it to them. Maybe I can cut it into pieces to make it easier to swallow ...

Explanation

Megan has won an award at a ceremony (presumably movie-related and possibly an Academy Award, as she mentions her director). When a person receives a major award, they give an acceptance speech which traditionally begins with the recipient thanking people who have helped them achieve the honor. Sometimes when a number of people are mentioned, the recipient will say that it was a team effort - a comment which elevates the "helpers" to virtually the same level as the recipient.

Megan's acceptance speech takes things a step further; she thanks not only her director, family, and friends, but also the bacteria that populate her gastrointestinal tract. She states that the bacterial cells outnumber hers, likely referencing the misconception at the time that bacterial cells outnumber human cells by a factor of 10 to 1. More recent estimates have gotten values around 1:1. While the bacteria in the gut make digestion possible, the ecosystem formed by bacteria in the urogenital tract and on the skin also protect human health. In short, without them Megan would die — and not be able to win the award. To thank her bacteria is comparable to thanking her parents: they did not really contribute to the movie, but without them there would not have been a Megan, and no award.

Recently, it has been shown that the gut bacteria has an effect on emotions, thoughts and mood. link

In the title text, Megan contemplates how to thank her microorganisms and considers to eat the trophy after having it cut in pieces. This is an extremely bad idea, because it might kill both her and the microorganisms.

A pint is a volume of about half a liter (specifically, the U.S. fluid version is 28 and 7/8 cu.in.).

#1544: Margaret

June 29, 2015

Otherwise known as Margaret the Destroyer, I will bring pain to the the Great One. Then again, maybe I won't.

Explanation

This comic uses the starting lines of an innocent children's book and creates irony by delivering a dark message.

In the book Are You There God? It's Me, Margaret. by Judy Blume, the opening lines are "Are you still there, God? It's me, Margaret. I know you're there, God. I know you wouldn't have missed this for anything! Thank you, God. Thanks an awful lot..." These lines describe a prayer, in which Margaret privately speaks to God, expressing gratitude and seeking guidance.

In the second and third panels, Margaret asks God "Are you scared, God?", and states "You should be". This is similar to threats delivered in some action movies, such as Taken, in which the protagonist or antagonist speaks directly to their opponent, issuing threats and indicating that they are coming after their opponent. The final panel is a shot of Margaret standing imposingly in a dark landscape, and a caption over the top of the image says "Margaret is coming for you", making this comic reminiscent of an action movie trailer. The irony is that "Are You There, God? It's Me, Margaret." is a very innocent book, especially when compared to this type of action movie.

The title text is a mashup of three of Blume's other books: Otherwise Known as Sheila the Great, The Pain and the Great One, and Then Again, Maybe I Won't,

and likely the inspiration for the dark lines in the comic.

#1545: Strengths and Weaknesses

July 01, 2015
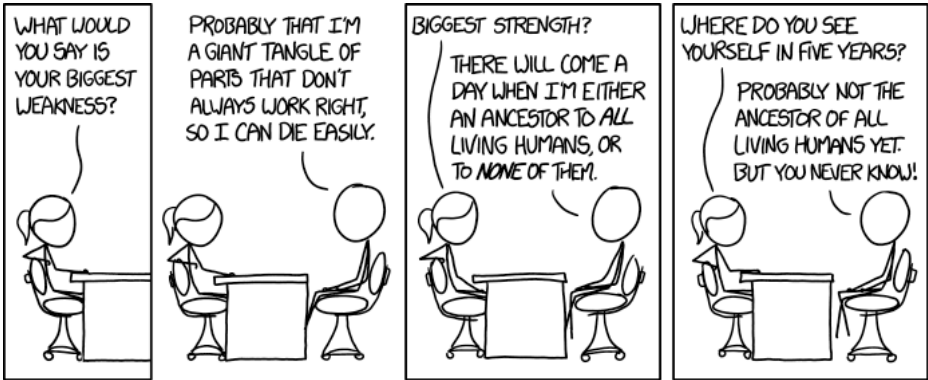
Do you need me to do a quicksort on the whiteboard or produce a generation of offspring or something? It might take me a bit, but I can do it.

Explanation

Cueball is in a job interview and is being asked stereotypical job interview questions by Ponytail, "What is your greatest weakness?", "What is your greatest strength?" and "Where do you see yourself in five years?"

In a roundabout way, Cueball answers that he is a living organism, and as such he has inherent flaws which could cause him to die. This is a reference to the fact that biological systems are "messy" and are not always optimal in design or operation. For example, cancer is a disease where the cellular machinery that governs cell replications breaks down and prolific cell division happens, endangering the organism through the creation of tumors. While this is a true weakness, it is also a weakness of all biological organisms and is not likely to help the interviewer determine if he is qualified for the job. However, it is likely to help the interviewer determine if he is right for the job — because the interviewer is likely to presume that a person who gives silly and unhelpful answers is not right for most positions.

For the second question Cueball answers that he will one day be the ancestor to all living humans or none of them. As you go farther and farther into the future the ratio of people alive will either go to 0% or 100% of the descendants of the character. The most recent common ancestor (MRCA) for humans is unknown but occurred some time after Mitochondrial Eve, around 140,000

years ago. If the MRCA's ancestors are traced back, the Identical ancestors point can be found, at which point the entire population are either ancestors of all living humans or of no living humans.

In the last frame, for Cueball to be the ancestor to all living humans within 5 years means that all the humans who are not his children or grandchildren (including Cueball himself), must have died in a near total extinction of the human race - his apparent optimism about the possibility of this occurring would therefore be worrisome.

The overarching joke is that, rather than answer Ponytail's questions with answers relevant to the job she's interviewing him for, Cueball is answering her questions from an existential standpoint. He may be assuming that she wishes to assess his fitness as an organism from a genetic perspective (in which his biggest limitation is survival time and mortality), or he may simply be misinterpreting or deliberately avoiding her questions from a professional perspective.

The title text takes this further, equating producing offspring during an interview (which would be awkward for all involved) with something that may actually help assess a candidate's efficacy as an employee, namely writing out a sorting algorithm on the spot, another stereotypical interview question (see also 1185: Ineffective Sorts, especially the bottom left panel).

In 1088: Five Years, Beret Guy is also asked where he will

be in five years, and he later interviews Hairy in 1293: Job Interview.
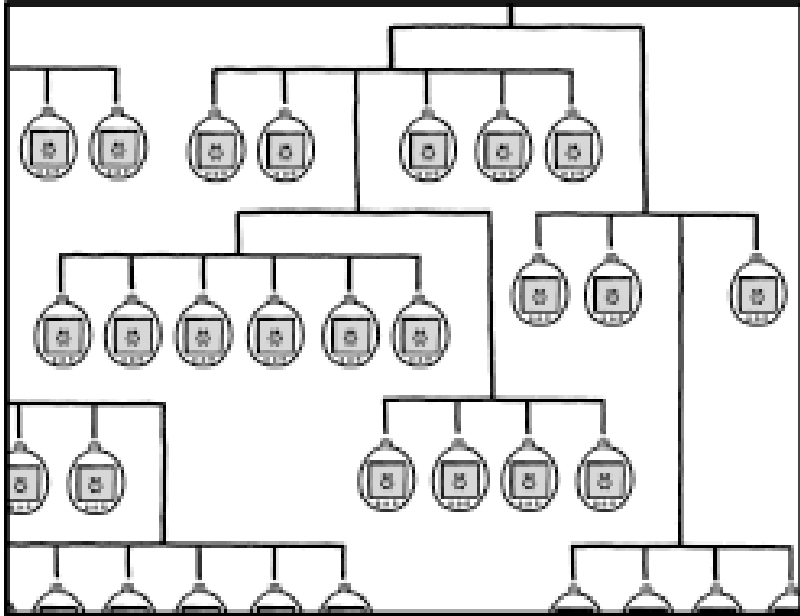
RUNNING A MASSIVE DISTRIBUTED COMPUTING PROJECT THAT SIMULATES TRILLIONS AND TRILLIONS OF TAMAGOTCHIS AND KEEPS THEM ALL CONSTANTLY FED AND HAPPY

The Singularity happened, but not to us.

Explanation

This is another comic in the My Hobby series. It describes a distributed computing network using an automated system to simultaneously run trillions of Tamagotchis. As with most of the "My Hobby" series, the concept would work, and is intricately connected to real world activities, but twisted enough to make it inherently absurd.

A Tamagotchi is a keychain-sized virtual pet simulation game from 1996. Ostensibly for children, they had appeal for people of all ages. The characters are colorful and simplistically designed creatures based on animals, objects, or people. Beginning with the 2004 Tamagotchi Plus/Connection, a second wave of Tamagotchi toys emerged, featuring a different graphic design by JINCO and gameplay which elaborated upon the first generations. However, the story behind the games remained the same: Tamagotchis are a small alien species that deposited an egg on Earth to see what life was like, and it is up to the player to raise the egg into an adult creature. The creature goes through several stages of growth, and will develop differently depending on the care the player provides, with better care resulting in an adult creature that is smarter, happier, and requires less attention. Gameplay can vary wildly between models, and some models, such as TamagoChu, require little to no care from the player.

Distributed computing is a field of computer science that

studies distributed systems. A distributed system is a software system in which components located on networked computers communicate and coordinate their actions by passing messages. The components interact with each other in order to achieve a common goal. Examples of distributed systems vary from service-oriented architecture based systems to multiplayer online games to peer-to-peer applications. Distributed computing is often used for tasks that require resources which would otherwise be impossible or prohibitively expensive to manage with single computers. This may include large Bitcoin network mining operations, the Worldwide LHC Computing Grid or, yes, running trillions of simultaneous Tamagotchis using an AI protocol. That said, using AI to keep trillions of Tamagotchis perfectly taken care of is a complete waste of time; the whole point of Tamagotchi is the challenge of caring for the digital pet yourself.

"The Singularity" in the title text refers to the technological singularity; a concept prevalent in science fiction and discussions of artificial intelligence (AI). The idea is that AI would become so sophisticated compared to a human brain that no human would be able to predict its behavior, motivations etc. from that point onward, and potentially human history after that point would therefore become unpredictable, as AIs would play dominant roles in determining its direction. It uses the metaphor of a mathematical "singularity", which is a point where established rules can no longer apply (for example, in a black hole or during the Big Bang, physical

conditions are such that the physical laws we use can no longer meaningfully predict what happens). An AI that is more sophisticated than a human brain could presumably then simulate human brains within itself, making it possible to upload human consciousness into a machine-simulated environment (see simulated reality and the simulation hypothesis). Thus, much science fiction that is based on the idea of The Singularity also focuses on the creation of a virtual world that much of the human race decides to plug itself into, much like the Tamagotchi Hive that Randall has created. Randall's mind, and the processing power in his computer, is far greater than any individual Tamagotchi mind, so simulating Tamagotchis becomes trivial for Randall, and no Tamagotchi could predict or control its own history with Randall around, in a humorous analogy with the Singularity concept.

#1547: Solar System Questions

July 06, 2015

My country's World Cup win was exciting and all, but c'mon, what if the players wore nylon wings and COULD LITERALLY FLY?

Explanation

This comic is a list of questions which Randall has about the Solar System, which at first glance may appear to be things that Randall would like to learn about. In actuality, most of the questions have not been satisfactorily answered or proven by anyone in the scientific community. These open questions may serve to intrigue readers and prompt further interest in astronomy and austronautics.

The title text refers to the 2015 FIFA Women's World Cup which was won by the USA the day before. The nylon wings and flying may be a reference to two passages from 3001: The Final Odyssey, one where Frank Poole tries out various wings while in an extremely low gravity environment, and one where he remarks while watching Swan Lake that Tchaikovsky could never have imagined a performance where the dancers were actually flying (due to aforementioned low gravity). This is also a reference to the last point on the list, because if we had such a stadium on the Moon, maybe it would be possible to use such wings to make very long floating leaps.

#1548: 90s Kid

July 08, 2015

UGH, DON'T YOU HATE HOW PARENTS ARE ALL "EAT YOUR CARROTS" AND "LOL, REMEMBER *RUGRATS* AND *DOUG?* SHARE IF YOU'RE A 90's KID!"
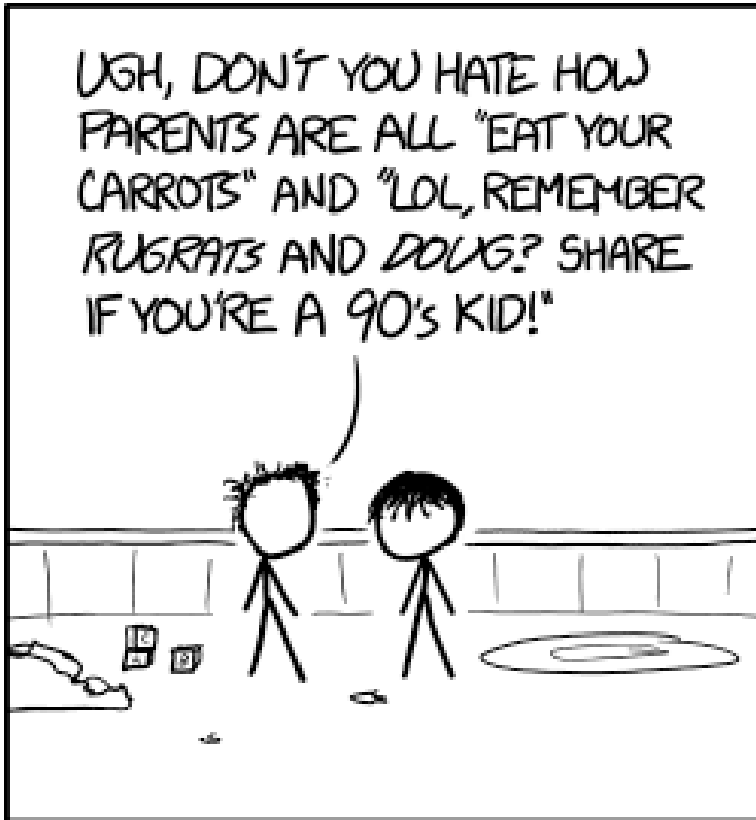
THE MEDIAN AGE AT FIRST BIRTH IN THE US IS 25, WHICH MEANS THE TYPICAL NEW MOTHER IS NOW A 90's KID.

We remember Rugrats, and think of them every time our kids look at us through their baby gates.

Explanation

This is another example where Randall describes the inexorable passage of time.

The children are complaining about things their parents tell them, as children often do. Their first complaint is something recognizable, the usual "just eat your vegetables, they're good for you." The second is about a comment "LOL, remember Rugrats and Doug? Share if you're a 90's kid" which, however, is a generic social media comment that a "90's kid" would make, not something you would expect a mother to say. At least not in the context of things their children are embarrassed about. But it illustrates that the teens and tweens of yesteryear are now adults, and parents at that.

According to the CIA World Factbook, in the USA the median age of mothers at their first birth is 25.6 (2011 estimate). On the date this comic was published, this would center the mother's own birth date in very late 1989.

Although there are various interpretations of the term "90's kid," most center around the person in question having had most or all of their childhood during the 1990s. The stereotypical '90s kid has a strong attachment to objects, movies, TV shows, phrases etc. from the era of their childhood, which bring back memories of their younger days. In this comic Randall picks up on a number of things which could be used to identify a '90s

kid:

- The use of the acronym "LOL" means laughing out loud, or laugh out loud, and was probably coined in the 1980s, finding its way into general usage with the later uptake of wider public Internet and should be known to every kid working or playing on a computer today.

- Rugrats is a cartoon that was produced from 1991 all the way to 2004, featuring the adventures of a group of toddlers and babies.

- Doug is another cartoon that ran from 1991 to 2000.

- The use of traditional social media, and more specifically of sharing the type of post described.

Given that the children shown in the comic appear to be somewhat older than newborn babies is not contradictory, since a 90s kid is anyone who was a kid during the '90s. So that would also include kids who turned five in 1990 or even ten; so in 2015 (publishing of this comic) a 90s kid could easily be more than 30 years old and thus have children more than 10 years old.

The title text suggests that viewing a child of one's own peering through such a barrier elicits nostalgia for the Rugrats cartoon. A baby gate is a semi-fixed piece of child-safety equipment to restrict a small child, typically a toddler, from leaving a safe area of a house, and especially to prevent access to stairways (up or down, where falls may happen), without overly inconveniencing an adult who can open the gate. Baby gates, fully enclosed playpens and similar barriers around

cots feature as usually insurmountable barriers to the younger characters in Rugrats, who are of crawling and toddling age.

If you're not completely satisfied with the phone after 30 days, we will return you to your home at no cost.

Explanation

This is the third entry in the ongoing xkcd Phone series which parodies common smartphone specs by attributing absurd or useless features to a fictional phone that sounds impressive but would actually be very impractical. The previous comic in the series 1465: xkcd Phone 2 was released over half a year before this one and the next 1707: xkcd Phone 4 was released almost a year later. The phrase "We made another one®©™" is a reference to how phone companies release new phones very often, and the trademarks that surround the phone itself. From the top, going clockwise:

The title text is a joke on guarantees and customer service. Usually, the advertisement says that if the customer is not satisfied with the product, they'll refund the money and take the product back at no additional cost. In this case they guarantee the customer they'll send them home without charge; implying they won't fix or refund anything. Or that due to anticipated but unspecified faults of some kind, the phone's owner will need help to get back home when things go wrong, and probably be thankful for such assistance, in yet another example of a worryingly non-specific 'reassurance'.

In addition, it says it would do so only AFTER thirty days, as opposed to the usual thirty-day return guarantee, which means you may be stuck with your phone for a month until you can be taken home yourself. Alternatively, the owner of the phone must be taken to a

specific place in order to use the phone, and if they return it, they will be allowed to return home.

#1550: Episode VII

July 13, 2015
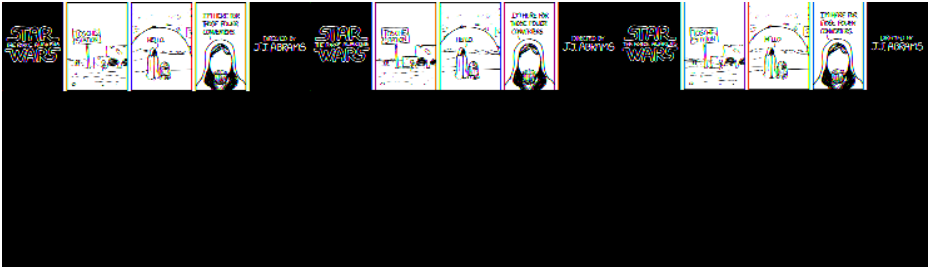
The Lord of the Rings sequel, set years after the Ring hubbub has died down, is just Samwise discreetly creeping back to Bag End to finish dropping the eaves.

Explanation

Sequels are often made to resolve pressing issues that are left unresolved in the original works. This comic was a humorous take on how the then-upcoming sequel in the Star Wars franchise might have resolved issues from a previous film in that series.

Star Wars background[edit]

In the first-produced movie of the series, Star Wars:Episode IV: A New Hope, Luke Skywalker's uncle tells him to clean two newly purchased droids (R2-D2 and C-3PO). Luke complains that he had plans to pick up some power converters at Tosche Station. Luke is told to clean the droids first; however, while doing so, he discovers a message carried by R2-D2, starting him on a course of events that runs through the original trilogy. As a result, he never ultimately goes to Tosche Station.

The conversation between Luke and his uncle, Owen Lars, is as follows:

Luke's line is one of many well-known lines from the series and is often-quoted as an example of how Luke is initially portrayed as a whiny teenager. By the end of the Episode VI:Return of the Jedi, Luke has grown into a mature and powerful Jedi, completing his transformation through the original trilogy.

Star Wars Episode VII: The Force Awakens was, at the time of the comic's release, the upcoming seventh feature-length live-action film in the Star Wars series, and was the first since the rights to the franchise were sold by creator George Lucas to the Disney

Company. It is a sequel to the original trilogy.

Since creating the original trilogy, many of Lucas's decisions in respect of the franchise have been subject to fan criticism, including criticism of the quality of three prequel films Lucas produced beginning in 1999 (after a more than 15-year hiatus). The new seventh film was entrusted by Disney to producer/director J.J. Abrams, who in 2009 produced and directed the highly acclaimed (although still highly criticized by some fans) Star Trek reboot.

Given all of this context, the new Star Wars film was as highly anticipated, or more highly anticipated than the prequel trilogy, and had a strong buzz around it. Much of the early buzz surrounded the nature of the new film's plot: For example, whether it would be a prequel or a sequel, and whether it would feature any of the original cast/characters.

J. J. Abrams and others involved in the filming Star Wars Episode VII: The Force Awakens had appeared in a panel at San Diego Comic-Con the weekend prior to the comic's release to unveil details about the film. This is likely the impetus for the timing of this comic.

The Comic[edit]

This comic portrays Randall's own conception of what the sequel might have been. In his version of the movie, Luke returns home to Tatooine years later with R2-D2 to finish the personal task that was interrupted by succesive chores, errands, tasks, trainings and missions that he had been required to undertake throughout the original film trilogy. Luke goes to Tosche Station and says "I'm here for those power converters", thus finally ready to start on his

own long postponed hobby. The action is bookended by the opening and closing credits, suggesting this uneventful scene comprises the entire film.

Therefore, the comic jokingly implies that getting the power converters was the most pressing of all the unresolved issues in the other films, and the most interesting upon which to base the sequel. In reality, this would likely be one of the least entertaining and most disappointing sequels that could possibly be made (perhaps second only to a version that had no reference to the previous films at all).

Randall may have also been commenting that there are few if any unresolved issues in the Star Wars franchise that required revisiting and that the series should be left alone. Or he could have been making a joke about how sequels call back to elements of previous movies without fully considering the context. In this case, the power converters are possibly something he had planned to soup up his old X-34 landspeeder. But that was originally sold in Mos Eisley, to cover the costs of his original travel off-planet, so finally getting around to that tinkering would also require reaquiring either his old X-34 or some suitable replacement craft. Another possibility would be to finally fix his T-16 skyhopper (unseen, but which we know he had often flown; though having apparently damaged at some point prior to the start of A New Hope).

The title text alludes to another fantasy franchise, Lord of the Rings, and how Samwise Gamgee was similarly interrupted from a menial task of gardening and listening in on conversations outside Bag End by Gandalf and his quest to save the world at the start of the first film. The title text uses the term "dropping eaves"

as Samwise did in his denial of eavesdropping in on the conversation between Frodo and Gandalf. In both cases, the issue of collecting power converters and Sam's gardening duties were left unresolved in their respective stories and the main plot of the series is thoroughly concluded.

#1551: Pluto

July 14, 2015
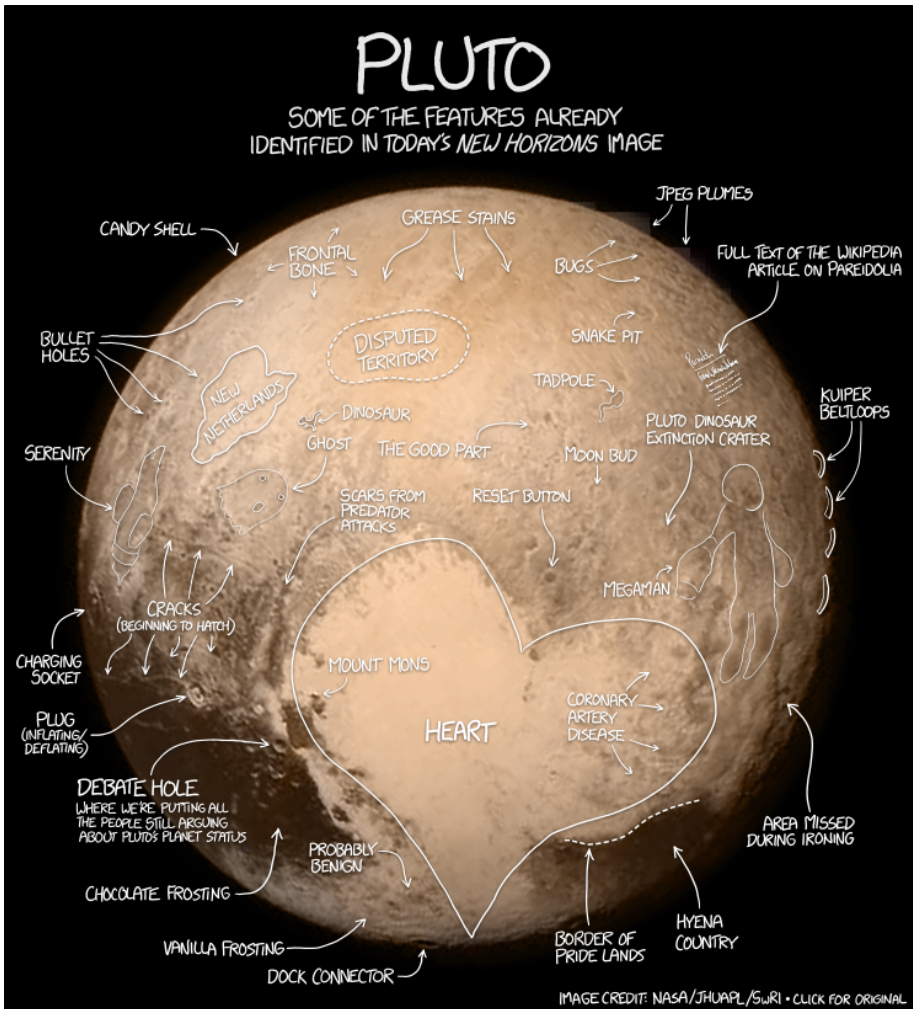
After decades of increasingly confused arguing, Pluto is reclassified as a "dwarf Pluto."

Explanation

This comic was posted on Tuesday, July 14, 2015, in honor of the New Horizons deep space probe making its flyby at Pluto, thus breaking the typical Monday/Wednesday/Friday cycle for the xkcd comics. Also on this day he released the first what if? in over three months, and it was called New Horizons. Luckily it did not end up back on Earth, as depicted in 1532: New Horizons, released 1½ month before closest approach.

Randall has taken one of the probe's images of Pluto, and outlined humorous examples of pareidolia on top of it.

It can be compared to preliminary descriptions by geologists, e.g. New Horizons' best look at Pluto before close approach|The Planetary Society.

The comic probably winks at Percival Lowell whose observatory photographed Pluto in 1915 "known" as Planet X. Unfortunately Percival Lowell is most famous for his drawings of the Canals on Mars which are widely misunderstood as channels based on wrong translations from Italian to other languages.

The title text refers to the debate as to whether Pluto should be classified as a full or dwarf planet. This debate was particularly brought into the public eye and came to be seen as a matter of controversy, following the 2006 IAU definition of planet. The text may imagine that this debate winds on, with definitions being created and

revised until a ridiculous state is reached whereby Pluto has a special class of celestial body named after it called a 'Pluto' but fails to fulfill the arbitrary criteria set up for it, and hence is called a 'dwarf Pluto'. There actually exist the terms Plutoid and Plutino, that relate directly to groups that Pluto belongs to, but see those pages for details of their use and usage. There has been a real naming conflict whilst generating those two categories, where Plutons was the name chosen initially, whereas Pluton is the usual name of Pluto in some languages.

Details on Randall's discoveries[edit]

Suggests Pluto is a confection, like Minmus. May also be a reference to the Mars candy bar.

The JPEG image format has the common issue of slightly distorting an image with Compression artifacts. The artifacts shown here do not appear in the official version of this image, but all data sent from New Horizons is compressed and artifacts are common — the full resolution images will be submitted to earth over the next 16 months. There have been tweets about people seeing plumes associated with active volcanoes and the like, which were explained as being artifacts.

Interpreting Pluto as a head, the frontal bone could be the light-colored region next to the darker top, just above the north pole facing to us.

The area above Pluto's north pole is attributed to grease.

Could refer to possible extraterrestrial life on Pluto in the form of insects, or "bugs". In the animated TV series Roughnecks:

Starship Troopers Chronicles, an adaptation of Robert Heinlein's novel Starship Troopers, the first battles with the alien "Bugs" took place on Pluto. Maybe it also refers to a software bug at the probe.

A string of small round features which Randall suggests was the result of Pluto getting shot repeatedly, probably by meteorites.

Reference to the what if?, Drain the Oceans: Part II, about draining the Earth's oceans onto Mars. In the previous what if?, Drain the Oceans, the Netherlands took over the Earth once their problem with the risk of flooding disappeared. And then they continued to issue forth from the portal that drained the oceans on Earth pouring them onto Mars, to claim Mars as New Netherlands. Presumably, something similar happened on Pluto. This was already again references in both an entry in the table and in the title text of 1555: Exoplanet Names 2.

Since the base photograph is identified as "today's New Horizons image," this indicates that a section of Pluto has immediately become the subject of some controversy, possibly a territorial claim or one of several references to the fact that Pluto was demoted from full planet status in 2006.

A generic map hazard.

Pareidolia is the human brain's tendency to see patterns where they don't exist. While probably a reference to Pluto's heart, the joke is also recursive: You'd be seeing the text of a Wikipedia article explaining to you that you couldn't actually be seeing the text of a Wikipedia article.

One of a number of pareidolic features Randall has outlined.

The Kuiper belt is a region in our solar system that contains an unknown amount of icy bodies, one known is Pluto. Randall jokingly refers to Kuiper Belt as the same kind of belt that's used to fasten clothing and identifies features on Pluto's surface as loops for the belt.

An outline of the Firefly-class spaceship Serenity, which was the titular vessel from the 2002 TV series Firefly.

Nobody can see a dinosaur unless Randall did this painting on Pluto's surface. And a complex comic needs at least one dinosaur.

A section of Pluto that is objectively better than the rest.

This could be interpreted as a moon growing/emerging out of Pluto, as a bud is "a compact knob-like growth". A round growth is seen at the location marked, resembling a small, emerging moon.

A reference to the classic video game Pacman, wherein the primary antagonists are one of four Ghosts. The Ghost on Pluto appears to have a mouth, however, unlike most depictions of the Pacman Ghosts. One of a number of pareidolic features Randall has outlined.

Suggests Pluto had dinosaurs and lost them the same way Earth did.

The Tombaugh Regio: the most prominent pareidolic feature Randall has outlined, and the only one (currently) also informally named as such by NASA.

Also known as ischemic heart disease, which causes degradation of

heart tissue. The region identified in the comic looks less 'healthy' (is darker and more ragged) compared to the rest of the 'Heart', which Randall suggests is caused by the disease.

Referring to the general practice of naming extraterrestrial mountains "X Mons" (e.g. Olympus Mons, a mountain on Mars and the largest mountain in the Solar System), as well as naming terrestrial mountains "Mount X". Since "mons" is Latin for "mountain", the feature's suggested name translates as "Mount Mountain".

A terrain feature suitable for connecting an outside source of electricity for the benefit of implied internal batteries. Compare "dock connector," below.

Implying that Pluto is some manner of a giant egg. Possibly a reference to the Doctor Who (click here) episode Kill the Moon, in which the Moon is revealed to be an egg from which a monster is hatching. A 2014 article from The Onion, "Moon Finally Hatches," makes the same joke. Also possibly a reference to The Light Fantastic, a Discworld novel in which similar objects are revealed to be the eggs of the world turtle. A similar idea appeared in Jack Williamson's 1934 short story "Born of the Sun".

Inflatable balls often have a "plug" or opening to insert a needle to inflate or deflate them.

Since it's all-caps, we can't tell if "PREDATOR" is a proper noun, but this is possibly a reference to the movie series Predator, about a race of aliens who hunt other beings for sport. Alternatively, a planetary predator (such as comic book villain Galactus) may have previously scarred Pluto.

The structure indicated is a small black dot (at least at this distance this picture was taken). Reset buttons on home electronics are often small buttons or holes used to reset the software of the electronic device.

One of a number of pareidolic features Randall has outlined, this one in the shape of a popular video game protagonist.

Pluto was reclassified as a dwarf planet rather than a planet following the latter term's controversial redefinition in 2006 by the International Astronomical Union. Arguments about the classification continue to pop up. The same argument is referenced in the title text. The name implies a proposal to put all the people still arguing about it in this hole on Pluto. This proposal further implies that the continued debate is very annoying by 2015, except perhaps to the debaters themselves.

The area indicated is near the terminator and shows some intriguing topographic relief.

A neoplasm or tumor is an abnormal growth of tissue. Randall is suggesting that the abnormal region near the heart has been evaluated by a doctor and determined to be benign.

Suggests the discrepancy in color over Pluto's surface may be a function of what cake frosting was used where. This area is the "dark spot" at the head of the "whale" (http://www.nytimes.com/interactive/2015/07/14/science/spac e/pluto-flyby.html). The so-called "whale's tail" (http://www.nbcnews.com/science/space/find-heart-whale-new-horizons-picture-pluto-n388816), is on the other hemisphere and is not visible in this image, it lies east about 90 degrees from the

chocolate frosting/dark spot here.

As above, suggests the discrepancy in color over Pluto's surface may be a function of what cake frosting was used where.

A reference to the Disney animated feature The Lion King. In the movie, the Pridelands is the bright and prosperous region ruled by the Lion King while a dark territory beyond its border is controlled by hyenas.

A continuation of the Lion King reference above.

From the point of view of the photograph, this feature of Pluto is at the planet's "bottom," where iPod dock connectors are. Compare "charging socket," above.

#1552: Rulebook

July 17, 2015

THERE'S NOTHING IN THE RULEBOOK THAT SAYS WE CAN'T KILL AND EAT YOUR DOG.

It's definitely an intentional foul, but we've decided it's worth it.

Explanation

This comic is a direct reference to the 1997 film Air Bud. In the film, a golden retriever becomes the star player on a basketball team. The obvious objection to an animal playing on human team is raised, but is handwaved by the referee responding "ain't no rule says a dog can't play basketball."

In organized sports, the rulebook is generally considered to be the final arbiter of decisions, but the interpretation that anything not explicitly considered in the rulebook is allowed is shaky at best. It's impossible for a rulebook to detail every possible scenario that someone could attempt, and certain basic assumptions about gameplay need to be made. Ponytail highlights this by pointing out that there's also not an explicit rule against killing and eating an opposing player. With human players, this would be covered by laws against murder and cannibalism, but dogs don't enjoy the same level of legal protection (there may be animal cruelty laws, but those are likely to be far less punitive).

The title text does acknowledge that killing and eating an opposing player is likely covered under the rules concerning fouls, but the benefit of committing the foul (the star player being dead) would be worth the resulting penalty (giving the other team a couple of free throws). This likely pokes fun at the common practice of intentional fouls. It's not uncommon for players to commit fouls intentionally, having calculated that they'll

gain some advantage (such as breaking the momentum of a play) which is worth the penalties they'll incur.

Randall previously parodied the "animal-as-player" loophole in 115: Meerkat. Rule books are also mentioned in 330: Indecision, 393: Ultimate Game, and 1593: Play-By-Play.
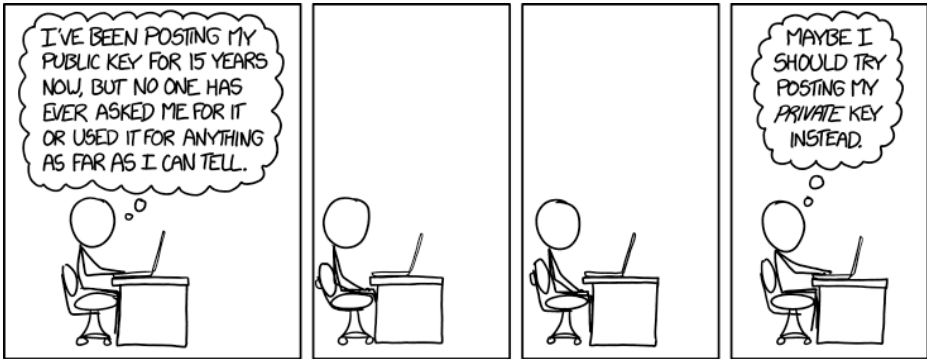
I guess I should be signing stuff, but I've never been sure what to sign. Maybe if I post my private key, I can crowdsource my decisions about what to sign.

Explanation

In public-key cryptography, two keys are generated for a user. The public key can be used to encrypt messages, but not decrypt them. The private key is necessary for decryption, and as its name implies, is meant to be used solely by the user.

Since the public key is initially designated to be shared, anyone who has that key can send the user an encrypted message that only the user can decrypt. Cueball has been following this rule, but he notices that it appears nobody has ever used his public key for anything. He contemplates sharing his private key, which he believes would generate more interest in him personally. However, he appears to overlook the fact that doing so would allow anyone to decrypt messages sent to him, thus defeating the entire purpose of encryption. (Although some systems can confirm the message sender by having a secret encryption key and a public decryption one, though this is negated again if both keys are released.)

The title text refers to another feature of Public-key cryptography: In addition to assuring that certain messages can only be read by a specific key owner, it can also assure that certain messages could only have been written by a specific key owner, by "signing" it using the private key. Anyone can read a signed message, but readers with the public key can then verify that the owner of the private key wrote (or at least signed) the

message, rather than someone pretending to be the owner. If Cueball published his private key, then anybody could sign any message as him, effectively impersonating him and also defeating the purpose of encryption.

Crowdsourcing is the term used for delegating work or tasks to a largely volunteered and uncontrolled set of people on the Internet. It is similar in concept to outsourcing, in which work is delegated to an external source of labor, typically a company in a foreign country. Famous instances of crowdsourcing include reCAPTCHA (in which users both verify they are human and help digitize words and phrases in books that digitization software cannot understand) and a farm in the UK in which ordinary Internet users make decisions about how the farm is run.

When Cueball first created the key pair, he imagined it would be something he used from time to time, for reading messages only intended for him or for sending "signed" messages. Since nothing of the sort happened, he imagines releasing both keys might cause some activity, and at this point he is happier with a "bad" outcome than with a boring one.

Randall previously ironically mentioned a public key in 370: Redwall.

#1554: Spice Girls

July 22, 2015

YOUR TURN: CAN YOU NAME ALL THE SPICE GIRLS?

HMM. HEARING SPICE, VISION SPICE, SMELL SPICE, TOUCH SPICE, TASTE SPICE?

THAT'S SENSES.

DENIAL SPICE, ANGER SPICE, BARGAINING SPICE, DEPRESSION SPICE, ACCEPTANCE SPICE.

STAGES OF GRIEF.

WAR SPICE, FAMINE SPICE, PLAGUE SPICE, DEATH SPICE?

YOU'RE NOT EVEN TRYING.

NO, WAIT, I CAN GET THIS FOR REAL. UHH... POG SPICE, STORY SPICE, SARAH SPICE, GENDER SPICE, BALEEN SPICE?

...CLOSE ENOUGH.

The Earth's five major mass extinctions were the Posh Extinction, the Sporty Extinction, the Scary Extinction, the Ginger Extinction, and the Baby Extinction.

Explanation

Cueball and Megan are apparently playing a game in which they name all of the elements in some category. Cueball asks Megan to name all of the Spice Girls, a pop group whose nicknames were

- Posh Spice (Victoria Beckham)
- Sporty Spice (Melanie Chisholm)
- Scary Spice (Melanie Brown),
- Ginger Spice (Geri Halliwell)
- Baby Spice (Emma Bunton)

Instead, Megan winds up making up names by tacking "Spice" onto words from other, completely unrelated categories:

- First guess: The five human senses: Hearing, Vision, Smell, Touch, and Taste.
- Second guess: The five stages of grief: Denial, Anger, Bargaining, Depression, and Acceptance.
- Third guess: The Four Horsemen of the Apocalypse: War, Famine, Plague, and Death.
- Fourth guess: Words that are phonetically similar to the actual names: Pog (Posh), Story (Sporty), Sarah (Scary), Gender (Ginger), and Baleen (Baby).

This seems to be a continuation of 1417: Seven, where Megan asks Cueball to name the seven dwarfs. Apparently Megan confuses different sets of five (or four

when she is not trying) which may be compared to the way Cueball mixes items from different sets of seven, thus not mentioning a full set, but just seven items from seven different sets of seven.

The title text has the correct "first" names of the Spice Girls, but replaces the "Spice" part of their names with "Extinction" to associate them with Earth's five mass extinctions. The five actual worst mass extinctions are:

- The Late Ordovician mass extinction event,
- The Late Devonian extinction event,
- The Permian–Triassic extinction event,
- The Triassic–Jurassic extinction event, and
- The Cretaceous–Paleogene extinction event.

Randall previously referenced the Spice Girls in 1511: Spice Girl (more specifically, using "Which Spice Girl Are You?" as an example of online personality quizzes).

And already in the next comic 1555: Exoplanet Names 2 he suggest to give five exoplanets around the same star the five nicknames. On the other hand, he suggests he mixes up different sets when they each consist of seven members.

#1555: Exoplanet Names 2

July 24, 2015

NASA HAS ANNOUNCED THE DISCOVERY OF A (SUPER-)EARTH-SIZED PLANET IN THE HABITABLE ZONE OF A SUN-LIKE STAR.

I SUGGEST WE NAME THIS PLANET "PLUTO," BOTH TO CELEBRATE THE GREAT WORK BY THE *NEW HORIZONS* TEAM, AND TO MAKE THE STUPID "IS PLUTO A PLANET" DEBATE A LITTLE MORE CONFUSING.

KEPLER-452b

WHILE WE WAIT TO HEAR FROM THE IAU, HERE'S A REVISED AND UPDATED LIST OF PLANET NAME SUGGESTIONS (SEE XKCD.COM/1253)

NEW OR UPDATED ENTRIES IN RED

STAR	PLANET	SUGGESTED NAME		STAR	PLANET	SUGGESTED NAME
	b	SPACE PLANET			b	FOURTHMEAL
	c	PILF		UPSILON ANDROMEDAE	c	STAMPY
	d	A STAR			d	MOONCHILD
GLIESE 667C	e	e'); DROP TABLE PLANETS;--			e	HAM SPHERE
	f	BLOGOSPHERE			b	COSMIC SANDS
	g	BLOGODROME		HD 20794	c	LEGOLAND
	h	EARTH			d	PLANET WITH ARMS
	b	SID MEIER'S TAU CETI B		HD 85512	b	LAX MORALITY
	c	GIANT DOG PLANET			b	GOOD PLANET
TAU CETI	d	TINY DOG PLANET			c	PROBLEMLAND
	e	PHIL PLANET		HD 40307	d	SLICKLE
	f	UNICODE SNOWMAN			e	SPARE PARTS
GLIESE 832	b	ASSHOLE JUPITER			f	NEW JERSEY VI
	c	*WATERWORLD* STARRING KEVIN COSTNER			g	HOW DO I JOIN THE IAU
	b	WAIST-DEEP CATS			b	NEIL TYSON'S MUSTACHE
	c	PLANET #14		GLIESE 163	c	HELP@GMAIL.COM
	d	BALLDERAAN			d	HAIR-COVERED PLANET
GLIESE 581	e	ETERNIA PRIME		PI MENSAE	b	MOON HOLDER
	f	TAUPE MARS		HD 189733	b	PERMADEATH
	g	JELLY-FILLED PLANET		KEPLER-22	b	BLUE IVY
EPSILON ERIDANI	b	SKYDOT		KOI-2474	b	STORE-BRAND EARTH
	c	LASER NOISES		KEPLER-437	b	UNICORN THRESHER
GLIESE 176	b	PANDORA		KOI-2418	b	SPHERICAL DISCWORLD
	c	PANTERA		KEPLER-438	b	EMERGENCY BACKUP EARTH
KEPLER-61	b	GOLDENPALACE.COM		KOI-3010	b	FEEEOOOOOOOOOP
GROOMBRIDGE 34A	b	HOT MESS		KEPLER-442	b	LIZ
KEPLER-442	b	SEAS OF TOOTHPASTE			b	HORSEMEAT SURFACE
GLIESE-422	b	THIS ONE WEIRD PLANET		82 ERIDANI	c	THE MOON
	b	SULAWESI			d	CONSTANT SAXOPHONES
EPIC-201367065	c	HUGE SOCCER BALL		HD 102365	b	LITTLE BIG PLANET
	d	GEODUDE		GLIESE 180	b	DUNE
	b	KERBAL SPACE PLANET			c	ARRAKIS
	c	A$$APLANET		FOMALHAUT	b	SWARM OF BEES
KEPLER-296	d	JURASSIC WORLD			b	SPORTY
	e	THIS LAND			c	BABY
	f	SPRINGFIELD		KEPLER-62	d	SCARY
HR 7722	b	BETELGEUSE			e	GINGER
	c	BEETLEJUICE			f	POSH
EPIC 201912552	b	NETHERLANDS VI			b	PLANET.XXX
	b	ANTISPIT		HD 69830	c	NOVELLA
GLIESE 3293	c	GOOGLE EARTH			d	SEXOPLANET
	d	PLANET OF THE APES (DISAMBIGUATION)		GLIESE 682	b	VERDANT HELLSCAPE
KEPLER-283	b	juəɹənəs			c	UNSUBSCRIBE
	c	ju'reɪnəs		KEPLER-452	b	PLUTO

I'm going to drive this Netherlands joke so far into the ground they'll have to build levees around it to keep the sea out.

Explanation

This comic is a continuation of 1253: Exoplanet Names, and was published the day after NASA announced the discovery of a number of planets, including a planet called a cousin to Earth, Kepler-452b. Black Hat proposes naming it Pluto, both to commemorate the flyby of the dwarf planet of that name by NASA's New Horizons earlier the same month, but also to end the discussion about the status of Pluto, which is subject to debate among both scientists and laypeople over whether-or-not it should be considered a planet. Pluto was considered a planet for a long period of time until, in 2006, the International Astronomical Union (IAU) created a new definition for the word 'planet' designed to exclude Pluto and similar objects, resulting in much debate (The IAU is the organization that takes responsibility for naming celestial bodies like planets, stars, and much more).

It may appear that, with Black Hat's suggestion, the answer to the question "is Pluto a planet?" will therefore always be "yes", regardless of the status of the Pluto in our Solar System according to the IAU. However the same IAU official definition that excludes Pluto also states that a 'planet' has to orbit our sun, so according to the IAU, nothing in this comic is a planet (the IAU definition only allows them to be exoplanets, which, like dwarf planets, are not planets). Hence, the debate indeed becomes 'a little more confusing'. This is in line with Black Hat's characterization as a mischief-maker.

The title text is referring to the planet name entry Netherlands VI for the star EPIC 201912552. Randall continues his references to the Netherlands taking over the Earth, Mars, and Pluto after Earth's oceans have been transferred to Mars. The joke started in two consecutive what if? articles, Drain the Oceans and Drain the Oceans: Part II, and it was referenced again in Dropping a Mountain and in 1551: Pluto a week before this comic came out. New Netherland was actually a Dutch colony with New York City, formerly known as New Amsterdam, as its capital. In the title text Randall mentions he will continue with this joke driving it so far into the ground (meaning way beyond the point where it stops being funny) that the Dutch will have to build levees around it to keep the sea out.

Table[edit]

This table explains each entry in the comic table. The "Status" column refers to the comic 1253: Exoplanet Names and indicates if the entry was already in the older comic (Old), if it has been updated (Update), or if it's a new addition (New).

#1556: The Sky

July 27, 2015

The other half has some cool shipwrecks, rocks, and snakes, but if you move those out of the way, it also has more sky.

Explanation

In this comic Cueball and Megan admire a majestic sky on a beautiful day.

This is one of the few comics where the scenery is drawn entirely in color, adding to the feeling of awe and natural wonder. The lighting on the clouds and the night sky in the upper corner suggest that this is either at sunset or sunrise, with the Sun on or around the horizon outside the left part of the image. The picture is drawn to show the ever changing beauty of the many different stages of the sky, rather than to be 100% realistic, as it would not be possible to see so many stars with the naked eye, as clearly as shown, if the Sun is still illuminating the clouds in front of them; perhaps a few of the brightest stars, a handful of the planets and the Moon, though probably not all in the same convenient patch of sky at the same time. When the Sun sets or rises, the light produces many different colors which can often be breathtaking to witness. The pouch shaped cloud formations are called mammatus clouds and are usually associated with the nearing of bad weather.

The comic, however, already starts in a small panel, with uniform sky-colored light blue background, above the large drawing described above. In this image Cueball says to Megan that he likes the sky, and Megan agrees. Megan first elaborates on her feelings in the large image, where the zoom out is so large that they have both become small and insignificant characters in the bottom left

corner. They are dwarfed by the sky and cloudscape, with the ground a broad dark band beneath them.

Megan makes a statement about the sky: It's one of my favorite halves. She thus indicates that she has more than one favorite half. As there are only two (non-overlapping) halves this thus implies that Megan likes both halves, i.e. she likes everything. Her statement is thus a tautology because it implies that the other half is also a favorite and there are no other segments that would not be amongst her favorites. There are several xkcd comics about tautology, e.g. 703: Honor Societies, 870: Advertising and 1310: Goldbach Conjectures.

In 1368: One Of The one of is also used in a similar way as there is really no other that that one in that comic, whereas here there are no other that has not be included. A very similar sentence is also used in the title text of 1524: Dimensions where the sentence, I would say time is definitely one of my top three favorite dimensions. This also makes very little sense as there are four dimensions with time, and the other three are indistinguishable as they are just three randomly chosen but orthogonal directions in space.

Taken at face value, given that the image depicts half open sky and half clouds, the other half could be taken to mean the clouds covering half of the sky. Or it could be the sky and the dark Earth, the other half beneath their feet. That it is the latter becomes evident in the title text. But, in the title text, Megan continues her comment to state that her other favorite half has some cool objects in

it, listing three types of objects:

• Shipwrecks
• Rocks
• Snakes

From this it becomes clear that it is not the clouds vs. the sky she's referring to but rather the sky vs. all the things in the 'other' half, on the basis of if you removed all the things in the non-sky half, including the Earth, that half would also be sky.

However, beyond the blue sky above there is just the dark night sky of outer space. If it were not for the Earth, the blue sky and its clouds would not exist, as it is formed by the air following the gravity and curvature of the Earth. So removing the entire Earth out from below you would remove the possibility of such a sky in any direction. A more selective removal might remove just enough planet to see some sky down in the lower-half, but the logistics of doing that whilst also getting a similarly unobscured view is somewhat unfathomable; even the thickness of the downwards atmosphere would make for significantly different effects, and a daylight sky above would tend to dictate that the sky directly down any hole would ultimately be a night-time sky.

This last part of the title text thus shows that Megan may be thinking rather of the night sky, and given that there are also stars visible in the top right corner, she could have assumed Cueball also referred to the sky like this rather than the majestic display of clouds and colors. Of

course that would be weird, but that's where the comedy occurs because that was unexpected, and it would be typical Megan and/or Randall.

If Megan is also interested in astronomy then she could also appreciate a dark and cloudless sky with stars. And by the same logic of the Earth was removed would leave only dark sky (empty space) around her on all sides, this may be considered a suitably satisfactory alternative. It is well know from xkcd that Randall really loves astronomy and looking at the night sky and, seen from this perspective, there would still be plenty of sky even if the Earth where removed completely. Though it would mean no clouds or atmospheric colors (or any humans or other lifeforms around to admire those astronomical objects).

I MET A TRAVELER FROM AN ANTIQUE LAND WHO SAID: "I MET A TRAVELER FROM AN AN- TIQUE LAND, WHO SAID: "I MET A TRAVELER FROM AN ANTIQUE LAND, WHO SAID: "I MET...

And on the pedestal these words appear: "And on the pedestal these words appear: "And on the pedestal these words appear: "And ...

Explanation

Ponytail is reciting the opening of "Ozymandias" by Percy Bysshe Shelley (see text below).

The poem Ozymandias is about the last vestiges of a once-great civilization that has since been lost to history. The poem is based on nested quotations: the poet, speaking to the reader, quotes a "traveler", who ultimately quotes words carved in the pedestal of a crumbling statue. When people recite the poem, they add yet another level of nesting, as the reader is quoting the poet, who's quoting the traveler, who's quoting the pedestal.

When Ponytail recites this poem, rather than reciting it normally, she adds more layers of recursive nesting, suggesting that she heard the story from a traveler, who heard it from another traveler, who heard it from another traveler. It's not clear how many layers of nesting this goes through before the rest of the text is cited (or whether the recursion is infinite).

The title similarly plays with recursion, quoting a pedestal which quotes a string of other pedestals.

The quotes are not nested properly, as they never end. So there is only the starting quotation mark (") for each quote. If she ever finishes there would be one closing quotation mark for each quote in the recursion at the end of her sentence. See 859: (.

A similar joke was used in 785: Open Mic Night

Ozymandias text[edit]

#1558: Vet

July 31, 2015
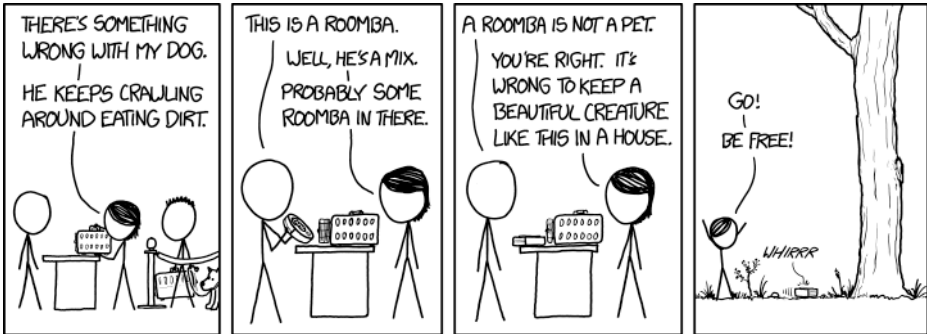
It's probably for the best. Since Roombas are native to North America, it's illegal for Americans to keep them in their houses under the Migratory Bird Treaty Act.

Explanation

Roomba is a brand of domestic cleaning robots manufactured by the company iRobot. The robots are designed to automatically vacuum floors. Although these robots are controlled by a quite simple software without any artificial intelligence, some owners tend to humanize them in the same way that others humanize their pets. There are several other comics related to a Roomba.

Megan presents a pet carrier to Cueball the veterinarian assistant. She says that her "dog" is "crawling around eating dirt", which sounds like certain types of behavioral problems one encounters in dogs, but is precisely what Roombas are made for. (However, the vacuum bag may need to be cleaned.) The vet then comments that it is a Roomba, to which Megan responds that the device (which has nothing to do with an animal) is a cross-breed, and agrees that there probably is "some Roomba" in it. She thus acknowledges the existence of Roombas, but still treats them as if it were an animal. It's common to talk about domestic dogs this way, but cross-breeding dogs with machines is impossible.[citation needed] The vet then goes on to say, with endless patience, that a Roomba is not a pet. This is taken by Megan as if the doctor said that her Roomba-like device is a non-domesticated animal (like a monkey, a fox, or the birds referred to in the title text) that can, but should not, be kept in captivity. In the last panel she consequently releases the vacuum cleaner and it whirs away to its 'freedom'.

The second customer, Hairy, has his dog on a leash, but is also carrying a pet transporter for the dog. Most likely he has arrived with the dog in the transporter (perhaps using public transportation) but has now taken it out so it can walk for itself, making the carrier much lighter.

The Migratory Bird Treaty act from the title text contains a list of over 800 bird species that are not allowed to be captured or killed. If the Roomba were to be classified as a native American bird and were added to the list, keeping them as pets would constitute capturing and would be considered illegal. This, of course, shows how confused Megan is. She previously stated the Roomba to be a dog and now apparently believes it is a bird, even though dogs are not birds[citation needed] and neither is the Roomba.[citation needed]

#1559: Driving

August 03, 2015
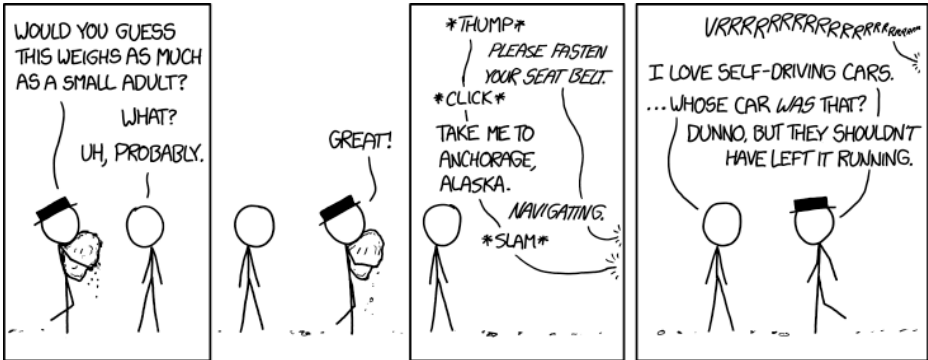
Sadly, it probably won't even have enough gas to make it to the first border crossing.

Explanation

A self-driving car is a car that requires no human interaction to navigate streets to a destination. Thus, when Black Hat places a rock that weighs "as much as a small adult" into the car's seat, he begins the process of fooling the car into thinking it has an occupant when it does not. His purpose in doing so appears to be to send the car to Anchorage, Alaska, which is presumably quite far from where Black Hat and Cueball are standing, thus taking the car far away from its owner with relatively little effort on the part of Black Hat. This is yet another evil prank from xkcd's resident classhole.

The title text references the fact that driving to Alaska from the contiguous lower 41 states requires two border crossings, once into Canada from the mainland, and once from Canada into Alaska. The car apparently begins some distance from the Canadian border, since it will likely run out of gas before reaching Canada. The title text expresses regret about this probable failure; perhaps Randall was looking forward to the encounter between the border guards and the vehicle's "occupant." However, even if the car does not get to Anchorage, Black Hat will have created a serious problem for its owner who will have to report the car as stolen.

Shortly after this comic appeared, Tesla released footage of a robotic charger that can connect itself to a Tesla automatically. If this kind of technology becomes common then a self-driving electric car might be able to

make a transcontinental journey without human intervention.

At the time of the release of this comic there were no places where self-driving cars were for sale to individuals. However, several corporate-owned test cars are frequently seen on public roads (such as those operated by Google among others). Nevada, Florida, California and Michigan were the first states to allow the testing of self-driving cars on public roads, and this legality is quickly spreading to many other states, as well as several countries in Europe. Alternatively, the comic may be set in a future where self-driving cars are common.

It could have been Beret Guy's car - see 1493: Meeting. Self-driving cars are a recurring topic on xkcd.

#1560: Bubblegum

August 05, 2015
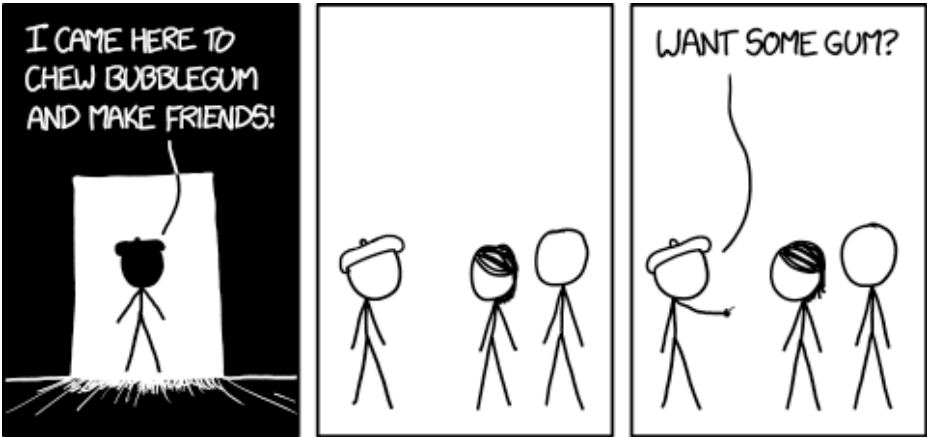
I came here to chew bubblegum and say no more than eighteen words ... and I'm all out of

Explanation

This comic spoofs the iconic quote from the 1988 action movie They Live, where the armed protagonist, upon entering a bank, states that "I have come here to chew bubblegum and kick ass, and I'm all out of bubblegum." This implies that the protagonist will soon fight the people in the bank, as he cannot do the other objective he came there for (chewing bubble gum). This phrase has been quoted and modified often enough that it's often mistakenly attributed to other sources.

Former wrestler Rowdy Roddy Piper, who played the protagonist in They Live, died five days prior to the publication of this comic so this comic is most likely a tribute to him. The iconic quote was an ad-lib Piper himself came up with.

In the comic, Beret Guy stands in an open doorway with a strong light behind him, a typical pose in action movies when someone is dramatically entering a room. However, in this instance, Beret Guy claims that he is here to "chew bubble gum and make friends". He then offers a stick of gum to both Megan and Cueball, making it clear he intends to do both of his stated objectives. This is expected from Beret Guy, who is usually both naïve about the world and beings that surround him, and also friendly to them.

The title text seems to be a slight dig at the trope of a laconic hero who utters only a few gnomic words, as in

the They Live scene. It is another variation of the line, with meta-humor. The speaker states that he is here to say 18 words and chew bubble gum, but reaches 18 words before he is able to finish his sentence. Thus, readers are left in ambiguity as to whether or not he is also out of bubble gum, as the line could end "and I'm all out of words", "and I'm all out of gum", or "and I'm all out of both." Of course if it is a tribute to Rowdy it could have been "and I'm all out of time!" And his time was up just then before that last word.

Strangely, though, Randall has not preserved the number of words in the original film quote: there are 16. There would be 18 if 'bubble gum' (which occurs twice) were taken as two words, but in the comic, it is clear that Randall takes it as one.

Beret Guy has previously indicated he has a finite number of words he can say in 1493: Meeting. In 3009: Number Shortage, it was indicated that they're running out of numbers.

In 1110: Click and Drag Megan, walking out on to a platform on the left side of the tower Burj Khalifa, says "I came here to chew bubblegum... And I'm all out of bubblegum" to which Cueball walking with her replies "That's a shame" (see picture here.)

#1561: Water Phase Diagram

August 07, 2015
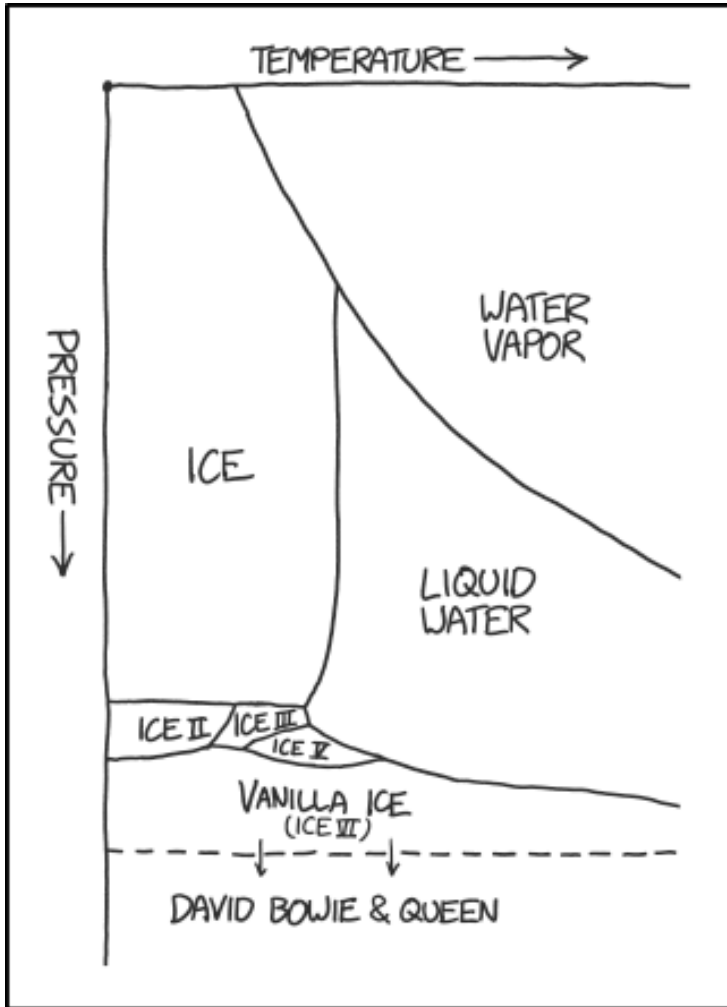
Vanilla Ice was produced in small quantities for years, but it wasn't until the 90s that experimenters collaborated to produce a sample that could survive at room temperature for several months.

Explanation

This is a modified version of the phase diagram for water. A "phase diagram" is a chart that shows the states, or "phases", that a substance will be in under various temperatures and pressures. Water's phases are particularly well-studied; on the real phase diagram for water, there are a great many phases listed.

Most people are familiar with three phases of water — solid (ice), liquid (water), and gas (vapour) — and with the fact that an increase in temperature will cause water to change from one state to another. The gas and liquid phases are quite straightforward; however, there is in fact not one single solid phase of water, but a variety of numbered phases ("ice I" through "ice XVI" are currently recognized), several of which are divided into sub-categories. Ordinary, everyday ice that forms on most parts of the Earth's surface is known as "ice Ih" ("ice one-h"). Most of the more unusual forms of ice only form under very high pressure.

Randall's phase diagram starts out realistically, though slightly simplified in several ways. For one, ice Ih is simply called "ice". It is focused in on a narrower area than the more complete diagram linked earlier; on that version, the "ice V" region is quite small, and "ice III" is barely visible, whereas both are quite plain to see on Randall's diagram. Lastly, where most phase diagrams have pressure increase upwards, Randall has the pressure scale increase downwards, this has been chosen to make it

possible for the jokes to appear at the bottom of the chart. Else the comic would not be funny for the average reader.

Because, as the diagram continues downwards and the pressure increases, the jokes begin. Beyond the moderately high-pressure forms of ice (ice II, III and V), a real phase diagram has ice VI; Randall has "Vanilla Ice (ice VI)". Vanilla Ice is the stage name of a white rap/hip-hop artist from the 1990s; the initials of Vanilla Ice, and the Roman numeral six, are both VI. Vanilla Ice's biggest hit, "Ice Ice Baby", used samples from the earlier song "Under Pressure", by David Bowie and Queen; accordingly, on Randall's diagram, the "Vanilla Ice" region transitions to "David Bowie & Queen" when it is under (even higher) pressure.

Further references to "Ice Ice Baby" are found in the title text. Near the beginning of the song, Vanilla Ice raps the line, "All right stop, collaborate and listen". The unusual choice of "collaborate" in this line has made it memorable, and the word is used in the title text (in a more typical context). The phrase "survive at room temperature for several months" is likely a reference to "Ice Ice Baby" being Vanilla Ice's only major hit, humorously suggesting he faded out of the public view after a few months of fame. Finally, even the word "sample" may be deliberately chosen as a reference to the sampling of "Under Pressure". "Ice Ice Baby" was written in 1983, but in 1990 Vanilla Ice finally admitted that he used unmodified samples from "Under Pressure" and paid royalties to Queen and Bowie. The title text of

1434: Where Do Birds Go whimsically suggests another possible phase of water/ice.

Randall has referenced "Ice Ice Baby" and "Under Pressure", separately and together, on many previous occasions, notably in 159: Boombox and 210: 90's Flowchart. The gag of having the performers of "Under Pressure" also being literally under pressure was also used in 1040: Lakes and Oceans. The what if? that was current at the time of this comic's publication was 138: Jupiter Submarine, which began with an even more fanciful phase diagram: that of a submarine. It also contains a reference to the songs "Under Pressure" and "Ice Ice Baby" in one figure, and "Can't Touch This" by M.C. Hammer in the title text of that figure (which generated similar controversy for sampling "Superfreak" by Rick James).
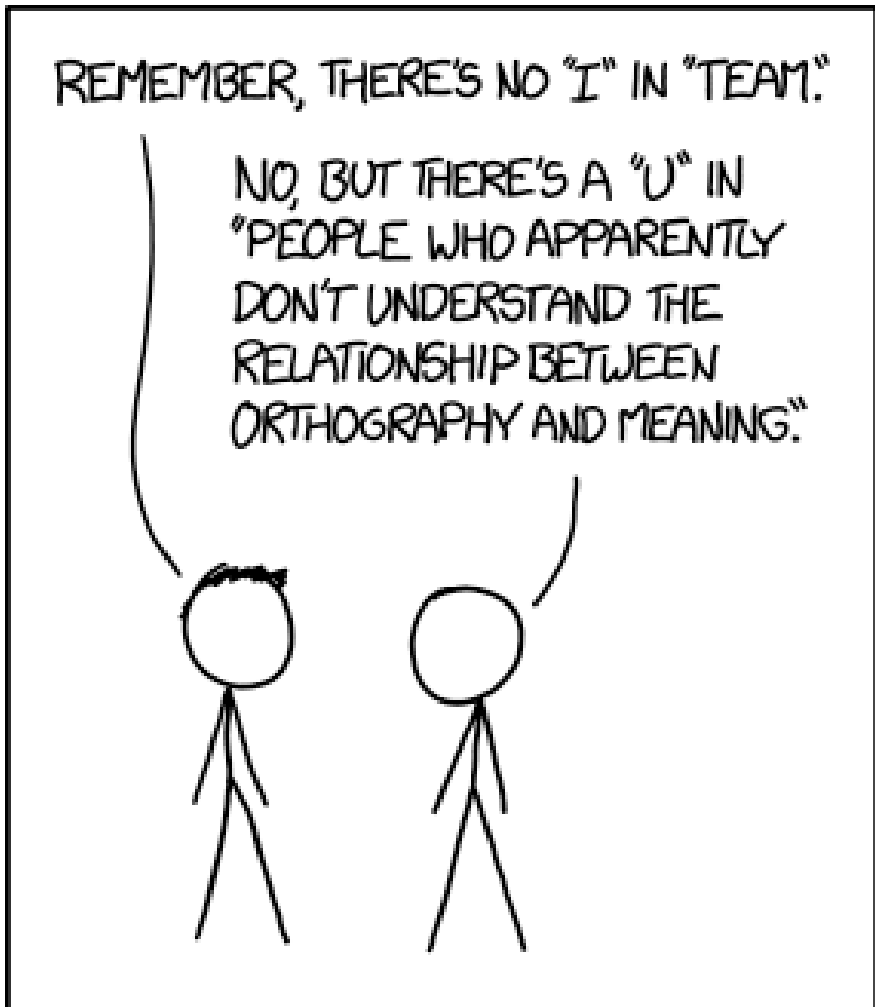
There's no "I" in "VOWELS".

Explanation

"There's no I in team" is a well-known saying that tries to encourage teamwork. The intention of the phrase is to state that, just as the letter "I" is not present in the word "team", doing things on your own is not constructive when working in groups. It can be used as a light reprimand to a team member who isn't cooperating, with the reminder that when working as a team one cannot think only for oneself, and must work in partnership with the rest of the team towards a common goal.

The phrase "no I in team" dates from the 1960s in the USA with printed references showing it is familiar to baseball pitchers such as Vern Law. As an aside, it's interesting that it seems to come from baseball, a sport where players have significantly more independence compared to, say, rugby.

Interestingly, the letters M and E can both be found in "team." This suggests that the phrase "There's no I in team" was a slight victim of cherry picking, especially when considering that "there's no me in team" would, strictly speaking, be a bit more grammatical. On a related note, in the International Phonetic Alphabet, an alphabet designed to spell words from every language in a completely unambiguous and straightforward manner, "team" would be rendered /ti:m/.

Of course, the spelling (or orthography) of a word doesn't relate to its meaning (an instance of the

use–mention distinction), and the comic makes fun of this by Cueball ironically echoing the sentence's sentiments by pointing out there is a "u" in "People who apparently don't understand the relationship between orthography and meaning", taking advantage that the letter <U> and the pronoun "you", here referring to Hairy, are pronounced identically.

Of course, it's very likely that Hairy knows that orthography doesn't determine meaning, and could easily reply "There's also a 'u' in 'People who assume aphorisms are literal'".

The title text "There's no 'I' in 'VOWELS'." provides another illustration of the distinction between orthography and meaning. "A", "I" and "U" are vowels, notwithstanding the irrelevant fact that they are not included in the spelling of "VOWELS".

Orthography was the subject of 1069: Alphabet.

#1563: Synonym Movies

August 12, 2015

SPACE FIGHTS: SUDDEN OPTIMISM

SPACE FIGHTS: THE GOVERNMENT WINS THIS ONE

SPACE FIGHTS: THE SWORD WIZARD IS BACK

THE JEWELRY GOD: THE JEWELRY TEAM

THE JEWELRY GOD: DOUBLE HOUSES

THE JEWELRY GOD: WE HAVE A CZAR AGAIN

SPACE TRIP: THE MOVIE

SPACE TRIP: THAT GUY IS ANGRY

SPACE TRIP: WHERE IS THE VULCAN?

SPACE TRIP: LET'S GO BACK
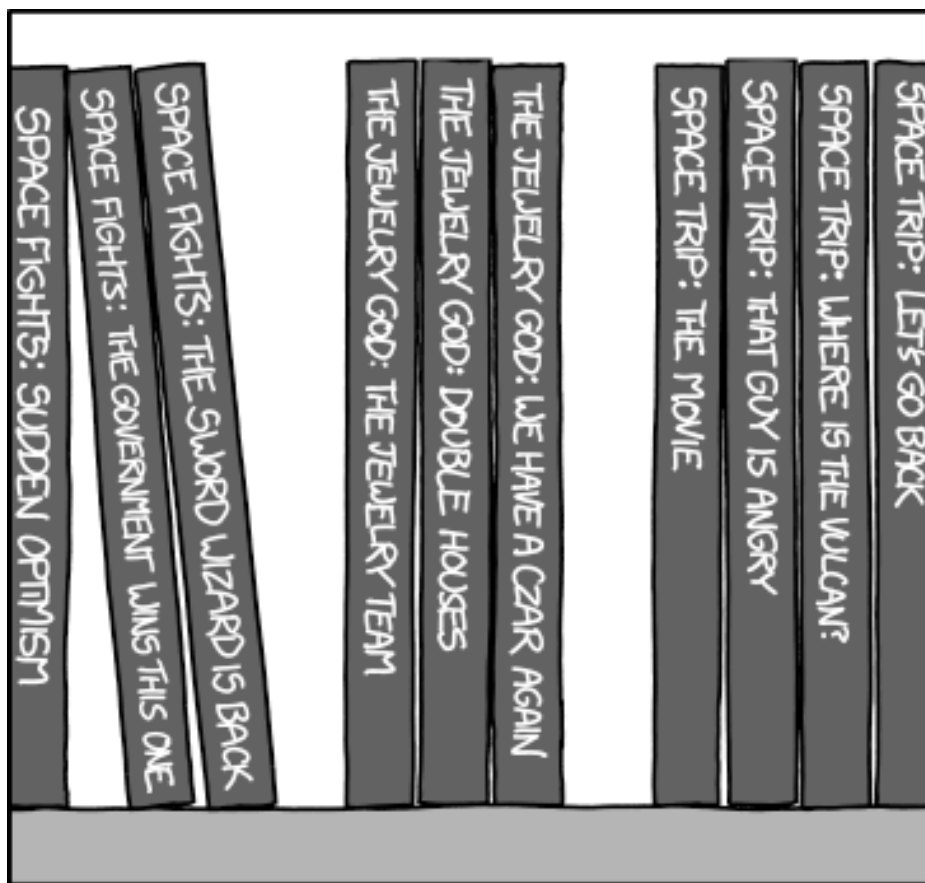
SYNONYM MOVIES

Fans eagerly await 2015's 'Space Fights: Power Gets Up',
although most think 1999's 'Space Fights: The Scary Ghost'
didn't live up to the hype.

Explanation

This comic shows several "Synonym Movies". It takes several well-known movies but changes each word of their names into a synonym. So Star Wars has turned into Space Fights, The Lord of the Rings into The Jewelry God and Star Trek into Space Trip. All these movies series have the same heading, and then a subtitle. There are ten of them in the comic, and two more in the title text. This comic became a series when more movies were spoofed in 1568: Synonym Movies 2.

The use of synonyms makes all these movies look ridiculous, for example, "The Sword Wizard Is Back" is a laughable-sounding movie,[citation needed] whereas "Return of the Jedi" sounds perfectly reasonable to us. Randall may be poking fun at movies that have ridiculous titles already, for instance, some people think this applies to a title like "Terminator: Genisys".

The title text refers to the latest Star Wars movie (2015-12-18), after Disney acquired the movie rights. The movie is called Star Wars: The Force Awakens and has now turned into Power Gets Up. As usual, with any Star Wars-related material, there is a huge fan base that eagerly awaits the new movie. But then again many people fear that it will not live up to their expectations, as was the case with the fourth movie, the first of the three movies in the second installment of Star Wars, Star Wars: The Phantom Menace, dubbed here as The Scary Ghost. As mentioned in the title text, that movie did not live up

to the hype.

A similarly humorous effect is achieved in 1133: Up Goer Five which explains the Saturn V rocket, but words and phrases are replaced with synonyms which are chosen from the most common English words. This renders ordinary words like "rocket" into "flying space car", or "helium" into "funny voice air" for example.

#1564: Every Seven Seconds

August 14, 2015
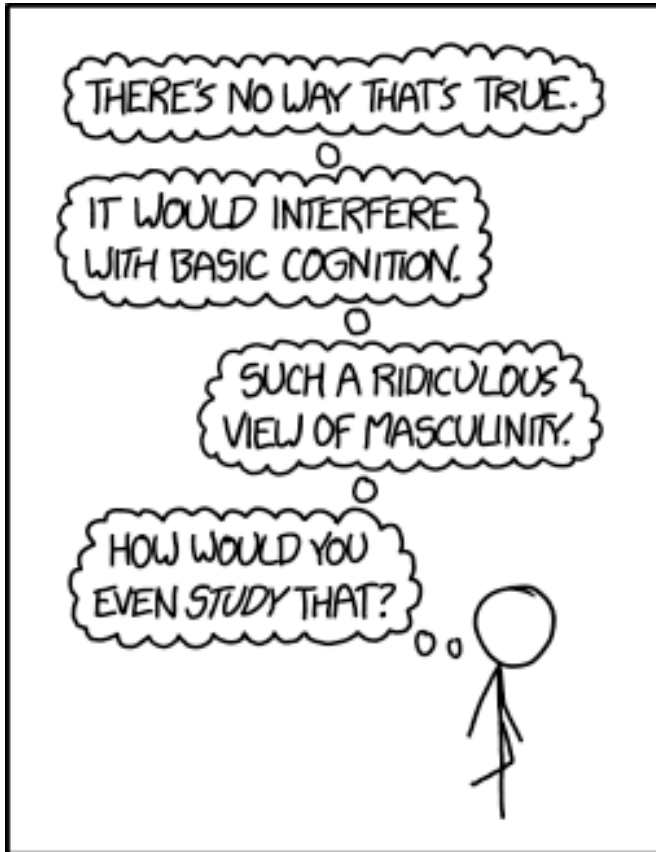
EVERY SEVEN SECONDS, SOCIOLOGISTS THINK ABOUT THAT MADE-UP STATISTIC ABOUT HOW OFTEN MEN THINK ABOUT SEX.

Every few months, I think about sex every seven seconds and how weird and implausible it would be.

Explanation

There is an oft-stated urban myth that men think about sex every seven seconds. See for example this BBC article, where they say that a more realistic number is 19 times in a waking day, i.e. once every 50 minutes.

In this comic Cueball is a sociologist, and the thought bubbles show his train of thoughts regarding this myth. First of all, he flatly denies that it could be true, and progressively his thoughts move to the effects if it were true, and then Cueball considers how it would even be studied. The title of the comic (Every seven seconds) hints strongly that this is the subject he is thinking about, and this is subsequently confirmed both in the caption and in the title text.

The setup is that thinking about sex every seven seconds would be dysfunctional and unproductive in addition to making working, social interactions and etcetera nearly impossible as explained by the sociologist's thoughts. The punch line is that thinking every seven seconds about how ridiculous it is to think about sex every seven seconds is just as dysfunctional and unproductive even if the thought time is spent refuting the original notion as understood in third person.

The irony of the comic is that in thinking every seven seconds about how impossible it would be for men to think about sex every seven seconds, the sociologist is, in fact, thinking about sex every seven seconds, albeit in a

roundabout way.

In the title text, the narrator (Randall or Cueball the sociologist?) says he thinks about how implausible it would be to have sex every seven seconds, several times a year. See alternate interpretations below:

In the title text, the narrator's statement leaves some meaning up to interpretation:

• Every few months, I "think about sex" every seven seconds [in one day, i.e. 8200 times that day] and how weird and implausible [having intercourse] would be.

Implying that narrator's sex life is not very active.

• Every few months, I think about [the statistic that men think about] sex every seven seconds and how weird and implausible it would be.

A take on the main comic's topic, mirroring Cueball's thoughts.

• Every few months, I think about "sex" every seven seconds and how weird and implausible [such an assertion] would be.

This interpretation is a bit paradoxical, because it implies that the narrator finds himself thinking about the very thing he dismisses as a possibility to think about so often.

• Every few months, I think about "sex every seven seconds" and how weird and implausible [such

behavior] would be.

A humorous twist on the main comic's topic, in which the narrator imagines having sex every seven seconds.

#1565: Back Seat

August 17, 2015

PROTIP:

HANG ON, I JUST HAVE TO CLEAR
A FEW THINGS OUT OF THE BACK.

WHEN YOU HEAR "I JUST HAVE TO CLEAR A
FEW THINGS OUT OF THE BACK", YOU ARE ABOUT
TO SEE, AT MINIMUM, A DECAYING RACCOON.

Hang on, let me scare the live raccoon over to the same
side as the dead one.

Explanation

This comic makes fun of the common situation of a messy car, using a hyperbolic scenario of that car containing decaying animals, in this case a raccoon. The joke being that such a car is so disgusting that a dead raccoon is not the worst thing that one might encounter. The humor comes from the car owner seeming to be used to a dead raccoon and the implications of what might be worse than a dead raccoon.

This is the polar opposite of 1267: Mess, where the person apologizes for a nearly non-existent mess. Here, the person minimizes a completely atrocious mess into a quick fix situation. The form of the comic is that of a pro-tip, which tells the reader what the phrase "I just have to clear a few things out of the back" really means.

'Protips' are used to give snarky, obvious or inadequate advice, in order to either humor a well-learnt audience or to prank a naïve audience. This phenomenon originated in a gaming magazine column offering advice on Doom: "To defeat the Cyberdemon, shoot at it until it dies.", which is analogous to saying that fire is hot. Randall has given us several Protips in the past as well.

The title text further exposes the reality of the person's knowledge of how bad the situation really is when he acknowledges the existence of the dead raccoon while trying to usher the live one to the same side. Protip: Sitting next to a dead and a live raccoon is not an

improved scenario, as the dead raccoon would probably be decaying, leaking bodily fluids into the back seat, staining the seat and making it wet, while the live raccoon may be aggravated, and possibly attacking the occupants of the vehicle.

August 19, 2015

... NOW, THIS PILE IS "ALLOWABLE DEDUCTION" CARDS. YOU MATCH THEM WITH CARDS IN YOUR HAND TO PRESERVE THEIR FULL POINT VALUE.

OVER HERE ARE "DEPENDENT" TOKENS...
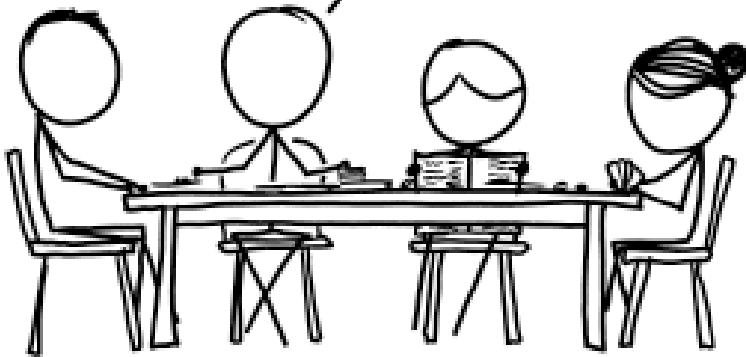
EVERY YEAR, I TRICK A LOCAL BOARD GAME CLUB INTO DOING MY TAXES.

Yes, it took a lot of work to make the cards and pieces, but it's worth it--the players are way more thorough than the tax prep people ever were.

Explanation

In this comic, Cueball is shown explaining the rules of a board game to three other players (Hairy, Ponytail, and Hairbun) of a local board game club – a hobbyist group that gets together to play board games. However, the board game Cueball is explaining is actually his own creation which is designed to trick the club into preparing his income tax return. The caption indicates that Cueball does this every year, which makes this comic reminiscent of the My Hobby series.

An income tax return is an annual document which most adults (and some teenagers) in many countries must prepare and submit to the government agency responsible for tax collection. The document sets out that person's income for the year, along with offsets including deductions and credits, and calculates the amount of income tax the person is required to pay to the government (used by the revenue service to compare it to the value that person had actually paid). The return requires understanding of a number of forms which may seem complicated to those not familiar with them. It is an annual task that is stereotypically met with confusion and disdain. Many people hire professionals to prepare their taxes. More recently, software-based solutions that walk the user through a series of more understandable text-based questions are available to aid taxpayers in completing their returns. However these are not always ideal for those with complicated returns.

In this comic, Cueball has developed his alternative method of tax preparation which utilizes the collective intelligence of several board-game-club players, and also capitalizes on the fact that members of such a club are likely very competitive and eager to succeed at board games. As a result (as the title text suggests), Cueball thinks the board game players are more thorough than the tax preparation professionals he has previously used. Such professionals would prepare perhaps hundreds of returns per year and as a result, might indeed be less thorough with each individual return which may all be viewed as fairly simple and repetitive by the professional.

Among the rules Cueball explains are references to "allowable deduction" cards which presumably reference certain deductions which are allowed on income tax returns to lower the net income (resulting in lower taxes). For example; a portion of certain medical expenses are permitted to lower one's income in recognition of the fact that using one's income for medical expenses is somewhat non-discretionary. Similarly, certain charitable donations are permitted as deductions to encourage such donations.

In Cueball's game, players must match the deductions with other cards to preserve their full "point value". This appears to be a reference to the desire to capitalize as much as possible on the value of a deduction by taking the deduction against income which would otherwise incur the greatest tax, and ensuring that the full amount of the deduction can be used. A deduction of $2,000 against income of $1,000 would waste half the

deduction.

In gaming, tokens are small playing pieces which may represent various things, depending on the game. In many board games (e.g.

Monopoly), tokens represent the players themselves. In other games, such as Magic: The Gathering, tokens can represent creatures or other items in a player's inventory. Cueball references "dependent tokens" which appear to be game tokens representing Cueball's dependents. Dependents are individuals for whom the taxpayer is entitled to certain deductions and credits, often related to expenses incurred to care for the dependents. Most commonly, dependents are the minor children whom the taxpayer is required to support financially, but in the United States (where Randall lives) a person can claim a qualifying child as a dependent as long as the qualifying child lives with the claimant and is not self-supporting, even if the claimant is not the person who supports the qualifying child, and a person who voluntarily supports another (without being required) may also qualify to claim the person. Also, U.S. law usually does not allow a person's own spouse to be claimed as a "dependent", even when financial support is required.

Note that while Cueball states he "tricks" his board game club into doing his taxes, in fact his use of clear tax terms ("allowable deductions", "dependent") for naming different tokens and elements of the game could suggest that the players knew what he was doing but going along with it because they just enjoy playing board games, such

that even doing a tax return – often considered a boring mind-numbing chore – within the format of a board game would be something they would enjoy doing. (On the other hand, it's possible that the players don't realize that the game involves preparing Cueball's own tax return.) Alternatively, the comic may be comparing the tediousness of some board games to that of doing tax returns. It is noted that there are board games on a variety of unexpected topics which might seem like boring subjects for a game. For example, there are several games designed to simulate the stock market and investing. The popular video game Farmville is often joked about having created a successful game out of a job most people would find unpleasurable. This suggests it might actually be possible to create an board game enjoyable to some people from the process of preparing a tax return.

This is one of several xkcd comics that suggest going to comically extreme lengths to avoid doing something (in this case, his taxes) that might have been simpler to do normally than the way Randall proposes. In this case, Cueball suggests that his motives may actually be to get the most thorough preparation possible, rather than to simply find a way to get the task done. There is actually a pretty solid basis to for this. Both gamification and crowdsourcing have been shown, in at least some cases, to produce results that can match or exceed those produced by professionals. For example, the University of Washington created an online game in which users tried to optimize the folding of protein structures. The results produced by players produced useful new

structures more quickly than computer simulations were able to. In this case, the work is being done by people who presumably have at least some enthusiasm for games, and who are likely competing with one another for the best results. Randall can then use the best outcome (that created by the winner) to optimize his own tax return.

A similar situation of Randall secretly exploiting someone's interest for his own purposes occurs in 1323: Protocol, and another board game can be found at 492: Scrabble. This was the first time Randall made a comic about people having trouble understanding the US tax system. Since then he has two years in a row made comics in relation to an approaching tax day. See the title text of 1805: Unpublished Discoveries and the entire comic 1971: Personal Data.

#1567: Kitchen Tips

August 21, 2015

Panel 1: IF YOU'RE ANYTHING LIKE ME, YOU MAY HAVE TROUBLE TELLING WHEN MEAT IS FULLY COOKED.

INSTEAD OF GUESSING, TRY A MEAT THERMOMETER!

Panel 2: IF YOU'RE ANYTHING LIKE ME, YOU PROBABLY THROW AWAY YOUR PLATES AND GLASSES WHEN THEY GET DIRTY. BUT IF YOU CLEAN THEM, THEY CAN OFTEN BE USED AGAIN!

Panel 3: MAKING SCRAMBLED EGGS? PUT A PAN UNDER THEM!

IT'S EASIER, AND IT KEEPS YOUR BURNERS CLEAN.

Panel 4: IF YOU'RE ANYTHING LIKE ME, YOU MAKE ICE BY SPRAYING A HOSE INTO YOUR FREEZER AND THEN SLAMMING IT SHUT.

BUT THERE'S A BETTER WAY...

Household tip: Tired of buying so much toilet paper? Try unspooling the paper from the roll before using it. A single roll can last for multiple days that way, and it's much easier on your plumbing.

Explanation

This is another one of Randall's Tips, this time with a series of Kitchen tips.

In this comic, Cueball appears to be hosting a show (or be in an ad) giving out kitchen advice. He starts with a reasonable tip to use a meat thermometer instead of guessing when meat is cooked, as many people would indeed make an perfectly good educated guess, from experience, outward appearances and prodding with a fork. The thermometer takes some guesswork out of this, but only adds another datum point that you still have to understand the significance of. His later tips, though, are little more than telling how to complete normal kitchen activities performed using common sense. Moreover, in most cases he repeats "If you're anything like me," suggesting he's actually done these things in his kitchen. This is a parody of many commercials and infomercials that imply their consumers have no basic motor skills or common sense in order to make their product more appealing.

The first tip he gives is reasonable because, though the use of a meat thermometer is fairly well known, not everybody goes to the trouble of using one. To determine if meat is done cooking, one can either guess or use a meat thermometer to check that the internal temperature has reached the correct level to render meat safe for consumption. Many people don't own a meat thermometer and rely on an alternative solution that

doesn't require special equipment (such as testing by feel, cutting the meat open to check its doneness, checking the color of the juices after pricking the meat with skewer, or simply guessing).

The second panel shows that Cueball throws away dishes and buys new ones every time they are used. This is perfectly normal if the plates are disposable plates made of paper or Styrofoam (though not exactly environmentally friendly), but we see his trashcan is filled with chipped glasses and ceramic plates. Naturally, this would be a very expensive practice. The virtually universal chore of "washing the dishes," is one Cueball presumes the audience is heretofore unaware of.

Cooking on a stove is typically done placing the food into a pot or pan which is placed on the burner.[citation needed] Cueball seems to suggest that the use of a pan is a tip most people would be unaware of, suggesting that most people cook eggs directly on the burners themselves, a method that is likely to burn the food and create a great mess. Cueball's stove has T-shape raised burners (probably gas, but might be electric), making the task very impractical, though owners of glass-top electric stoves could conceivably cook directly on the glass surface.

Ice is usually made by filling an ice cube tray with water and leaving it in a freezer for several hours. Cueball, however, sprays a hose directly into his freezer compartment and quickly slams the door shut to trap some water inside. (This would work somewhat better in

a chest freezer, which has a door on the top, as it could be filled with water and the door would not need to be closed to trap the water inside.) While this unorthodox method will make ice, it will result in a large sheet of ice on the bottom of the freezer. More importantly, it will also make it impossible to actually use the freezer to hold anything else (unless you were to put anything in beforehand and you don't mind breaking through a block of ice to get it out). Also, ice expands as it cools (it is one of the few substances with a negative coefficient of thermal expansion), and its expansion might push the freezer door open.

The title text, a household tip, suggests using toilet paper a few sheets at a time, which is how most people use it. Cueball, however, seems to suggest that most people use the entire roll as a single object without unspooling it and then flushing it whole, using at least one roll each time they use the bathroom. This is economically impractical, and is prone to clogging the toilet and the plumbing if you throw the toilet paper away by putting it into the toilet and flush it.

For more household tips like the one in the title text, see the sequel to this comic: 1715: Household Tips.

#1568: Synonym Movies 2

August 24, 2015

The book spines read:

WANDBOY AND THE MAGIC ROCK
WANDBOY AND THE HIDDEN ROOM
WANDBOY AND THE FUGITIVE
WANDBOY AND THE BURNING CUP
WANDBOY AND THE FIREBIRD CLUB
WANDBOY AND THE BOOK OWNER
WANDBOY AND THE MAGIC STUFF (1/2)
WANDBOY AND THE MAGIC STUFF (2/2)
PUNCHER
PUNCHER II
PUNCHER III
PUNCHER IV
PUNCHER V
PUNCHER LASTNAME
TROPICAL BOATERS: SPOOKY BOAT
TROPICAL BOATERS: ANGRY WORMFACE
TROPICAL BOATERS: BOATS EVERYWHERE
TROPICAL BOATERS: VITAMIN WATER
PROFESSOR WHIP AND THE BOX OF GOD
PROFESSOR WHIP AND THE SCARY CHURCH
PROFESSOR WHIP LOOKS FOR A CUP
PROFESSOR WHIP IS IN ANOTHER MOVIE

There's also the TV show based on the hit Hot and Cold Music books: Fun With Chairs, Royal Rumble, Knife Blizzard, Breakfast for Birds, and Samba Serpents.

399

Explanation

This comic made a series out of its predecessor as it continued the idea from 1563: Synonym Movies with a new set of movie series. As with the previous comic, the titles aren't always direct synonyms with the original (Indiana Jones as Professor Whip), but now it seems to be even more exaggerated, sometimes making synonyms of the plot synopsis instead of the subtitle ("Vitamin Water" refers to the Fountain of Youth rather than the Stranger Tides).

This set includes Wandboy (Harry Potter), Puncher (Rocky), Tropical Boaters (Pirates of the Caribbean), and Professor Whip (Indiana Jones).

The is in Another Movie title in the Professor Whip series differs from the other titles in that it does not reference the plot of the movie. The more dismissive reference may be due to Indiana Jones and the Kingdom of the Crystal Skull being poorly received by fans of the series.

The title text is a reference to the TV series Game of Thrones, based on the book series A Song of Ice and Fire. All of these titles are direct synonyms, but such that they remove most of the meaning from the titles. For instance, nobody actually cares about the physical object of a throne, but the political power it represents. Birds eating in general have a very different implied meaning than crows feasting specifically, as groups of crows only gather

to eat when there is a lot of food, such as a corpse, and as such have a strong cultural association with death and slaughter.

#1569: Magic Tree
August 26, 2015
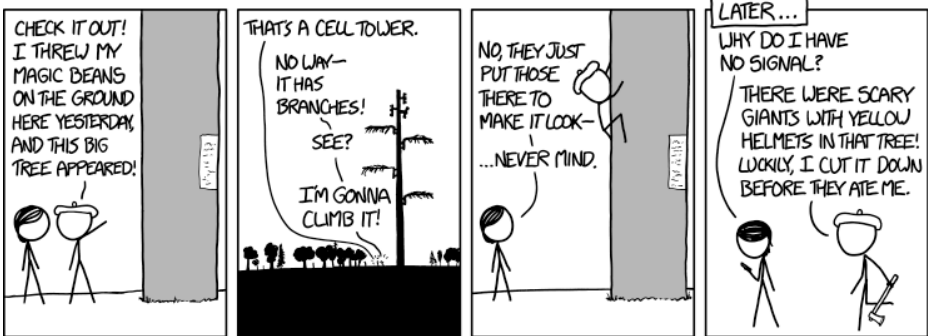
Since people rarely try to cut down cell phone towers, after millions of years, as cell phone towers have gotten more treelike, trees have started growing fake cell phone tower attachments and shiny gray bark to protect themselves. This is a standard textbook example of convergent evolution.

Explanation

This comic features a running theme in the xkcd comics, Beret Guy's naïve and/or odd ways of thinking. In the beginning of the comic, Beret Guy shows Megan what he believes to be a tree, and explains that it grew there because he placed magic beans in that spot yesterday. This is a reference to the fable "Jack and the Beanstalk", where the protagonist plants several magical beans he acquired, resulting in a beanstalk growing which ascends into the atmosphere. Megan, however, tells Beret Guy that the "tree" is actually a cell phone tower. Beret Guy disagrees, pointing out that it has branches, to which Megan tries to explain that this was in an attempt to make the towers look like trees. She gives up, however, as Beret Guy has already begun climbing the tower, or because she fears that giving this explanation would only add fuel to the fire that is Beret Guy's imagination.

Later, Megan complains that her cell reception has disappeared. Beret Guy responds by saying that he had to cut down his "tree" because there were "scary giants with yellow helmets" in it (presumably, construction workers). This mirrors, again, the "Jack and the Beanstalk" fable, where the protagonist has to cut down his beanstalk to prevent the giant, whose lands the beanstalk connects to, from climbing down and chasing him. In reality, the "giants" were probably utility workers. Additionally, in reality it is a bad idea to cut down cell towers, as they contain dangerous electricity, as shown in the 2017 film Daddy's Home 2.

The title text suggests that, over time, trees will evolve to start looking more like cell phone towers in a form of mimicry in order to avoid people cutting them down. Mimicry is where a creature copies the appearance or behavior of another in order to confuse predators. In this scenario, the more defenseless trees attempt to mimic cell phone towers, which have the defense of people not wanting to cut them down or they would lose cell service (and likely a significant amount of money through fines) and because of society's general respect for the property of others, as well as the dangers of electrocution or radiation. This is similar to the counting pine, a tree in Terry Pratchett's Discworld series that evolved to display its age with numbers on the outside (in the bark) in the hope that humans would not cut it down and count its rings. Of course now humans hunted it down trying to find a tree with numbers that would fit their house number instead, thus quickly rendering the trees almost completely extinct. (See the tribute to Terry in 1498: Terry Pratchett).

Convergent evolution deals with multiple species acquiring similar characteristics to fulfill their role (such as dolphins and sharks both having a streamlined shape to swim fast) due to the species' common need to adapt to similar environments or tasks. Randall uses the term to describe the convergence in the appearances of cell towers whose design has "evolved" to include tree-like branches and trees which he predicts will evolve to resemble cell phone towers. Each of these "evolutions" would be for the purposes of camouflage, although the

cell towers "evolve" by human design for purely aesthetic reasons and the trees would evolve naturally for self-preservation. This would therefore not be a true example of convergent evolution. It more closely resembles Batesian mimicry, or the evolutionary process by which a species remains noticeable, but treated as something it is not.

#1570: Engineer Syllogism

August 28, 2015

AN ENGINEER SYLLOGISM

1: I AM GOOD AT UNDERSTANDING NUMBERS.

2: THE STOCK MARKET IS MADE OF NUMBERS.

3: THEREFORE, I— WOW, WHERE DID ALL MY MONEY JUST GO?
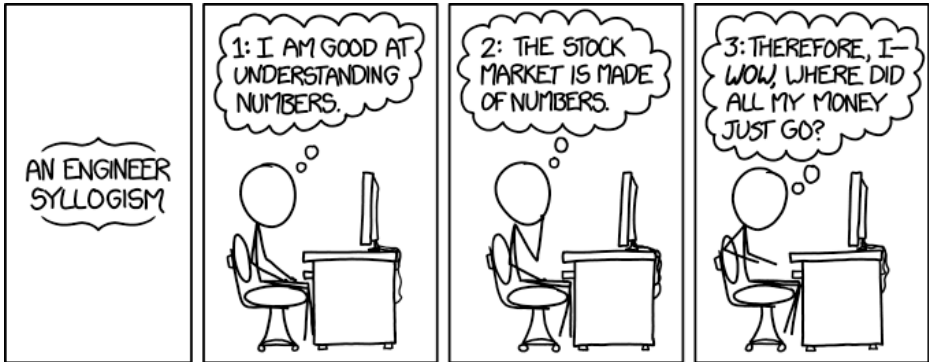
The less common, even worse outcome: "3: [everyone in the financial system] WOW, where did all my money just go?"

Explanation

A syllogism is a logical argument where two or more propositions lead to a conclusion through deductive reasoning. For example, one of the best-known syllogisms is:

In this comic, Cueball is an engineer who is attempting to make the following syllogism:

Since most engineers are purportedly good at math, proposition 1 seems to be true. It is also loosely true that the stock market is made of numbers, but only in the sense that every system can be given a post-hoc numeric characterization; the dynamics of the stock market are primarily human-driven. In this comic Cueball thinks that his skill at math will help him beat the stock market. Little does he know that the system can be unpredictable, so he ends up losing money as the financial instrument he's invested in loses value. This is due to the financial markets being largely controlled by humans making emotional decisions and not some calculable reason or logic.

High frequency trading does make use of computer software to determine trades (and thus is a lot closer to being "just numbers") but being successful relies on direct low-latency access to financial exchanges that an individual can't get access to. Many engineers (generally software and computer) work at these companies but wouldn't be able to make money trading on their own.

Fundamental analysis is also a number-oriented way to determine the value of a company (and thus whether the current price of a stock is good or bad) and can be done by an individual, but requires making qualitative decisions on what data to use and how to do the analysis so it is not "just numbers".

Even if the propositions "I am good at understanding numbers" and "The stock market is made of numbers" were true in Cueball's interpretation, Cueball would still be wrong to conclude that "I am good at understanding the stock market": this would be a fallacy of the undistributed middle (with the first premise being more accurately stated as "I'm good at understanding things made of numbers") and a fallacy of composition (with the implicit third premise "if I'm good at understanding the components of a system, then I'm good at understanding the system"). The problem is that proposition 1 seems to say "I am good at understanding all math". However, the "all" is not present, so Cueball may not necessarily understand the math underlying the stock market.

This comic is also related to the 1998 movie π where the main character repeats to himself several times his assumptions that the world is all numbers, and thus he, a great mathematician, should be able to predict the stock market, which is all numbers. He believes that maybe his work on patterns in pi will provide some deeper insight into the patterns in the stock market, a project that drove his mentor crazy and may in fact be making his computer self-aware.

The title text talks of the scenario where it was Cueball who causes everyone involved in the financial system to lose their money. This could refer to a scenario in which Cueball figures out a way to extract large quantities of money from the stock market, causing a sudden, major decline in everybody else's wealth, or that his involvement has caused literally everyone, including his own, stock market assets to lose their value. This is possible since there is no conservation of value for the stock market. The value of a particular stock is determined by a majority that is willing to trade it at a given price.

The release date of this comic makes it highly likely that it refers at least in part to the 2015 Chinese stock market crash which largely affected most other world financial markets, particularly during the week of August 24–28, during which this comic was published.

Two, less likely, interpretations of the title text have been suggested:

This scenario has been mentioned before, in the title text of 592: Drama.

A similar fallacy is presented in 2933: Elementary Physics Paths.

#1571: Car Model Names

August 31, 2015

CERTAIN LETTERS AND NUMBERS ARE USED
DISPROPORTIONATELY OFTEN IN CAR MODELS
COMPARED TO REGULAR TEXT.
(SEE: "REV-4 CR-X X3 G6 MAXX")

LETTER AND NUMBER SCORES BASED ON RELATIVE FREQUENCY IN CAR MODEL NAMES
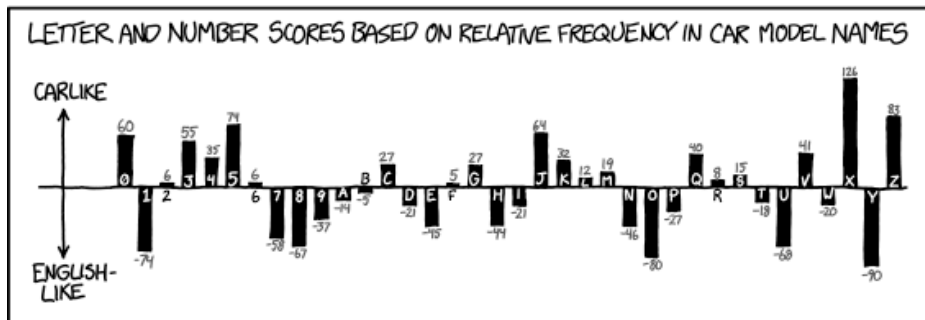
BASED ON THESE SCORES, HERE ARE A
FEW SUGGESTIONS FOR CAR COMPANIES:
(WITH AVERAGE LETTER SCORES)

NAMES TO AVOID	POTENTIAL HITS
HONDA 2CHAINZ (-0.13)	HONDA 3CHAINZ (0.57)
MITSUBISHI FHQWHGADS (-0.62)	SUBARU ANDRE3000 (1.30)
KIA 49ANDGOTHY (-2.96)	SUZUKI SEXISM (1.82)
CHEVROLET NICEGUY (-3.09)	LINCOLN MARXISM (2.17)
OLDSMOBILE GOODWOOD (-4.44)	HYUNDAI CLIMAX (2.48)
INFINITI TOOTHY69 (-4.51)	PORSCHE ZIZEK9000 (3.06)
BMW OUTHOUSE (-4.85)	LEXUS 3x3CUTRIX (3.22)
VOLKSWAGEN WOODPONY 70H7 (-5.70)	ACURA PIZZAJAZZ (3.56)
CHRYSLER UH IONO (-5.65)	FORD SIXAXLE 4x4 (3.95)
NISSAN DOODY (-5.84)	TOYOTA CERVIXXX (4.85)

CLIMAX is good, but SEXCLIMAX is even better.

Explanation

In English, letters like X and Z are rarely used in the common vernacular. Marketers have found that names with these infrequently-appearing letters sell more products.

There are two explanations for scores. Both of them share the fact that Randall must have used a car-name database to calculate letter frequency in car models.

There are 19 positive scores and 17 negative scores, which is interpreted differently in each explanation.

This formula generates a positive number if a letter is more common in car models than in typical English (as X) which Randall then calls carlike. The formula generates a negative number if a letter's relative frequency in car models is lower than in typical English (as O) and Randall calls it English-like (more suitable for readable text). The letters F and B, with scores of 5 and -5, respectively, are about as common in English as in car models. With this nomenclature, the most English-like letter is Y because, while not the most common English letter, it is apparently extremely rare in car models. The most common letter in ordinary English is E, which is (presumably) fairly common in car models.

It seems that Randall arbitrarily used positive and negative numbers: if a letter is very common in car models (as X) he calls it carlike. If a letter is very

uncommon in car models (as O) he calls it English-like. With this nomenclature the most English-like letter is Y, but actually Y is the least carlike letter. The most common letter in ordinary English is E. Y on the other hand is just in the middle (place 13), which can't be called English-like.

Randall devised an index for car models which is the score average divided by 10.

We take 2Chainz and add the scores of its different numbers and letters: 6 +27 -44 -14 -21 -46 +83 = -9

The average is -9/7 ≈ -1.29. Then we divide that by 10 and we get -0.129 or -0.13.

- Honda 2Chainz - 2 Chainz is an American rapper
- Mitsubishi Fhqwhgads - A reference to a running joke on Homestar Runner.
- Kia 49andGothy - Gothy or gothic is a member of the goth subculture; most of its members are much younger than 49
- Chevrolet Niceguy - A reference to the idiom "nice guys finish last".
- Oldsmobile Goodwood - May be a reference to the Goodwood Festival of Speed
- Infiniti Toothy69 - "69" is slang for a sex position where two participants pleasure each other orally; for obvious reasons, many would not want teeth involved.
- BMW Outhouse - Loose standing toilet, or Outhouse.

- Volkswagen Woodpony 7oh7 - Wood ponies are wooden constructions to give kids (and sometimes adults) the feeling of riding a horse, but don't actually move. 7oh7 is a way to pronounce 707, which could be a reference to the Boeing 707 passenger jet series.
- Chrysler Uh Iono - When pronounced, sounds roughly like someone slurring "Uh, I don't know"
- Nissan Doody - An incredibly juvenile term meaning feces. May reference the unfortunately named Nissan Moco, which is Spanish for snot
- Honda 3Chainz - A play on 2Chainz in the previous section; according to the table the number 2 has a score of 6 and the number 3 has a higher score of 55; the index will go up by (55-6)/7/10=0.7.
- Subaru Andre3000 - André 3000 is an American rapper
- Suzuki Sexism - Akihiro Suzuki is a Tokyo city assemblyman who made sexist remarks in June 2014.
- Lincoln Marxism - Marxism is a political method of societal analysis which has been used to critique Capitalism. There are various essays noting its founder and Abraham Lincoln exchanged letters during the American civil war. Lincoln is also the marque for the Ford Motor Company's luxury vehicles, capitalist status symbols throughout the late 20th century. Its juxtaposition with Marxism is thus particularly ironic.
- Hyundai Climax - In this context, an orgasm. The title text finds an excuse to add another "x" with the model SexClimax.
- Porsche Zizek9000 - A portmanteau referencing

academic Slavoj Žižek and the Saab 9000

- Lexus 3×3Cutrix - 3×3 is a play on 4×4; this car presumably has 3 wheels. "Executrix" (in leet "3×3Cutrix") is the female counterpart of "executor", one who administers a will.

- Acura PizzaJazz - The letter Z has a very high score, so using 4 of them in a fairly short name makes this a potential hit.

- Ford SixAxle 4×4 - A contradictory name, as the 4×4 refers to a vehicle that has all four wheels connected to the drivetrain, which would only use two axles. May also be a reference to the Sony PlayStation's Sixaxis controller.

- Toyota Cervixxx - A portmanteau of cervix and XXX rating used by pornographic industry to make titles seem more extreme (see X rating). It being the highest scoring item on the list may be an attempt to show that sex sells.

Note that Randall gives the symbol × the value of 126, which means he equates it with the letter x.

As mentioned in the comic, the index for the word "climax" is 2.48. However, applying the index to the phrase "sexclimax" yields a value of 2.72, higher than that for "climax".

The xkcd Survey: Big Data for a Big Planet

Explanation

As the comic image states, it links to a survey created with Google Forms, containing a series of questions. The questions range from mundane typical survey questions such as "Do you have any food allergies?", to rather strange, such as "Fill this text box with random letters by randomly mashing keys on your leopard." (See 1530: Keyboard Mash and 1031: s/keyboard/leopard/).

The stated goal of the survey is to "create an interesting and unusual data set for people to play with". A strange data set is a ripe opportunity for a sampling of readers. It′s also supposed to be "a search for weird correlations" – presumably the goal is to be able to say things like "people who have been skydiving are (more/less) likely than average to dislike cilantro". (See also 882: Significant about finding presumably spurious correlations between unrelated data.)

HTML image maps is a technique for marking up areas of an image on a web page, such that each area can be a link without the whole image being a link. Randall could have used this type of image map to make only the "Click here to take the survey" button be a link, and none of the rest of the image. But he cannot get the hang of it (or knowing his skills, does not wish to take the time to learn it). Not getting the hang of HTML image maps was also referenced on the banner for his book tour for the first What If? book. See the link for other instances where he mentions this problem in the header text.

The title text is a joke off of Big Data, which is a name for analysis of a set of data that includes a huge amount of information. He also says "for a big planet" because the Earth is big.[citation needed]

The survey is now closed, and the questions were replaced by the text:

To this day, the data has never been released, and there is no indication of when the data is intended to be made public.According to a Reddit user, Randall crashed Google Forms, so the data took much longer to be retrieved. This is similar to his breaking of Wolfram Alpha while answering a reader's question on his what if? blog.

September 04, 2015

We had gathered that raw information, but had yet to put it all together.

Explanation

Ponytail presents a FY2015 (Fiscal Year for 2015) budget for cyberintelligence, but is then interrupted with a snide remark about the prefix cyber. Although it is not specified what organization the budget is for, the size of the budget ($8.1 Billion) is large enough to suggest that it must be a large government organization such as the United States Department of Defense.

This comic illustrates that some organization spends obscene amounts of money on their "cyberintelligence" budget, yet all that spending appears not to have informed them that the prefix "cyber-" fell out of fashion years ago. That the prefix could annoy experts were already used in the title text of 1084: Server Problem.

The prefix "cyber" is derived from "Cybernetic," which comes from the Greek word κυβερνητικός, meaning skilled in steering or governing. Cyberintelligence could also be called cyber spying i.e. spying in the digital world, one of many "new" words with the cyber- prefix. Many were invented in the 1980s and 1990s, following the example of "cyberspace", popularized by William Gibson in 1982.

If cyberintelligence departments were given names today, they might be called Internet Intelligence, Virtual Intelligence, Data Intelligence or Online Intelligence departments.

This may be due to the fact that government organizations are typically named by middle-aged or senior officials who are generally less likely to be familiar with the current trends in technology language. They are more likely to stick to the words that were used when they first learned about the technology. Such organizations, being bureaucracies, are also unlikely to change their name.

The title text continues the joke by implying the organization learned about the demise of "cyber-" yet failed to process or analyze that data. It is a common problem among intelligence organizations to gather "raw information" (such as photos, or reports from spies) but be unable to make use of it because there wasn't time to process the information into intelligence by determining what it means. This is particularly true for intelligence gathered by or relating to computers, as they can generate data far faster than people can review it. It may also be a reference to the previous comic, which was a link to a survey for xkcd readers.

"Cyberspace" and "cybernetics", illustrated here, are two of the most common words with that prefix (Cyberspace 6 times as prevalent as cybernetics at their peaks). "Cyberintelligence" is shown here. Cyberspace was used 4000 times more often, although the more common spelling splitting it in two words "Cyber intelligence" was 1.35 times more used than in one word. But even combining these two versions cyberspace is still used more than 1700 times as often.

#1574: Trouble for Science

September 07, 2015

MANY COMMERCIAL ANTIBODY-BASED IMMUNOASSAYS ARE UNRELIABLE

PROBLEMS WITH THE p-VALUE AS AN INDICATOR OF SIGNIFICANCE

OVERFEEDING OF LABORATORY RODENTS COMPROMISES ANIMAL MODELS

REPLICATION STUDY FAILS TO REPRODUCE MANY PUBLISHED RESULTS

CONTROLLED TRIALS SHOW BUNSEN BURNERS MAKE THINGS COLDER

Careful mathematical analysis demonstrates small-scale irregularities in Gaussian distribution

Explanation

The comic highlights the fact that several well-publicized scientific critiques have recently been published that raise questions about some commonly accepted scientific methods. For scientists, these critiques serve as reminders of the dangers of overconfidence in any method, hopefully leading those who have naively accepted results to remember that any scientific conclusion is by its very nature tentative and limited by methodological reliability. However, popular press reporting of these papers may lead a general public of modest scientific literacy to the impression that science might be in trouble, as implied by the title. Some of these methodological issues and shortcomings are well known in the scientific community but are – for better or worse – the best toolkit science has at its disposal today. This is however greatly exaggerated by the last (fictional) headline, which suggests that Bunsen burners in fact have a cooling effect, which is of course absolutely ridiculous, but would nevertheless change one more fundamental scientific belief drastically. Additionally, each headline contains irony or a double meaning for comical effect.

The titles of five scientific articles are shown:

Immunoassays are biochemical tests that leverage the specific binding between an antibody and its antigen to detect and quantify substances, typically proteins, hormones, or pathogens. These assays are foundational

in various fields, including medical diagnostics, biotechnology research, environmental monitoring, and food safety testing. This statement about their unreliability is true: see Kebaneilwe Lebani, Antibody Discovery for Development of a Serotyping Dengue Virus NS1 Capture Assay, 2014. In this Ph.D. thesis, 11 references are given.

In empirical research, one is usually interested in effects, results and relationships in a population. However, for practical reasons, only smaller subsets of populations, called samples, are available to the researcher. Usually, an effect of interest is tested using a sample. The purpose of hypothesis testing is to determine whether the observed effect (or lack of effect) in a sample is a random artifact of our particular sample, or whether there is a good chance that it also exists in the population.

Generally, a null hypothesis states that there is no effect in the population while the alternative hypothesis states that there is an effect.

P-values are used in hypothesis testing. The p-value is the probability of observing an effect, result or relationship in your sample data, given that no such effect, result, or relationship exists in the population. It is based on the sample data and the particular statistic (such as sample average, t or F). A statistic is the result of a calculation based on the sample. A p-value can be calculated for each statistic of interest. Formally, the p-value is the probability of observing a test statistic equal to or greater than the one based on the sample data, given that the null

hypothesis is true.

The threshold for p-value cutoff, α, is pre-specified (usually 5% or 1%, which is more conservative). When the p-value is lower to or equal to α, the null hypothesis is rejected in favor of the alternative hypothesis. When it is higher than α, the null hypothesis is retained.

The value used for α has been proposed by Fisher and is arbitrary.

The use of p-values as a measure of statistical significance is frequently criticized, for example in Hubbard & Lindsay. Randall has demonstrated this problem in the past in 882: Significant.

Keenan et al. makes this case. Additionally, the word model takes on two meanings. In one sense, "model" can refer to a scientific description that makes sense of a phenomenon; in another sense, "model" can refer to an individual whose job it is to demonstrate fashions, typically fashionable outfits. Fashion models are notorious for being exceptionally thin, and so overfeeding would compromise their job as a model.

A replication study is a study designed to duplicate the results of a previous study by using the same methods for a different set of subjects and experimenters. It aims to recreate the results to gain confidence in the results of the previous study as well as ensure that the findings of the previous study are transferable to other similar areas of study.

Randall is probably referring to this recent study described in Nature: Over half of psychology studies fail reproducibility test. It might also be a reference to at least 3 studies mentioned here: http://www.jove.com/blog/2012/05/03/studies-show-only-10-of-published-science-articles-are-reproducible-what-is-happening. There is also irony in the phrasing of the title because in biology replication is a form of reproduction.

Another possible interpretation of this headline is that a replication study, which may have successfully replicated the results of the specific study it was designed for, failed to reproduce the published results of many other unrelated studies. The headline is quite vague as to which results have been considered in this study.

The theme of this comic is that commonly accepted scientific methods can be unreliable, and the joke here is that a Bunsen burner, a device intended to heat things, is newly discovered to always cool things instead, which would be absurd.

In theory, yes, putting a Bunsen Burner underneath an object that's already incredibly hot would, slowly, equalize the temperature between the flame and object resulting in cooling. Given that a Bunsen Burner burns between 1000 K and 2000 K, there is probably some methodological error if the testing materials were already much hotter than the flame (more than 2000 K). It's also possible that if the "controlled trial" involved a Bunsen burner that was not lit, but was turned on to allow gas to

flow, it would have a cooling effect as the gas expanded from the line pressure to atmospheric pressure. Another alternative theory is that a cold substance, such as cold water or frigid air, was fed through the burner against a warmer object.

Alternatively, a trial could be set up to test something against a Bunsen burner on the one hand, and an even hotter flame on the other hand. As compared to that hotter flame, the Bunsen burner would not heat up the tested material as much, resulting in something being made "colder" than the alternative.

As in the previous headline, the key to understanding the joke here is to examine the headline's ambiguity, as no clue is given about how the trials were controlled.

This is another joke of a premise that is obviously untrue. The Gaussian distribution is a mathematical construct that is generally known as the bell curve or the Normal distribution. As it is an ideal mathematical construction, by definition, it cannot have any irregularities - similar to how the equation $y = 2x + 1$ cannot have small-scale irregularities. The joke probably alludes to the fact that many types of observations are frequently initially modeled as a Gaussian distribution, though on careful observation the actual distribution of outcomes will often deviate from a pure Gaussian distribution. The joke could also refer to the fact that when a Gaussian distribution is plotted on a screen, small 1-pixel irregularities can become visible merely from the screen's pixel size; this is not an irregularity with the Gaussian

distribution itself, but only with the plotting.

In addition, an experiment to test a Gaussian distribution will have a finite sample size, giving a non-exact Gaussian distribution. A possible paper submitted would conclude that this result is "approximately a normal distribution" with "small-scale irregularities". A news reporter without knowledge of statistics could easily misinterpret that this paper decisively concludes errors in the mathematical definitions (rather than coming from random error inherent in experimenting).

#1575: Footprints

September 09, 2015
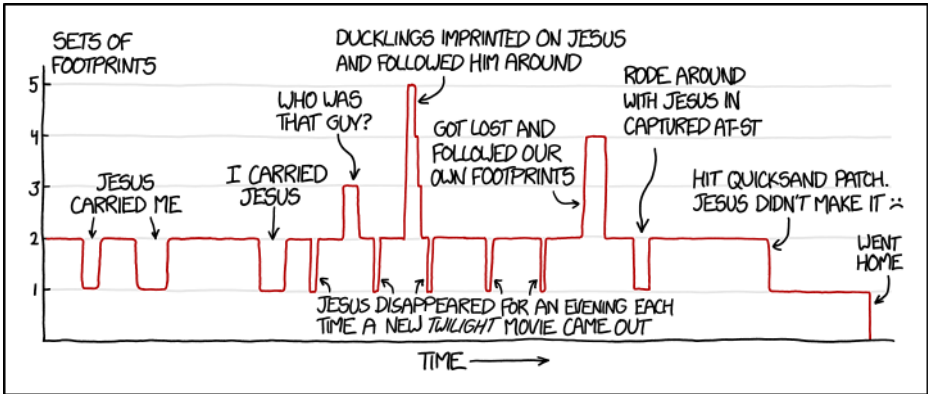
"There's one set of foot-p's cause I was totes carrying you, bro!" said Jesus seconds before I punched him.

Explanation

The comic is a satirical graphical representation of the inspirational Christian poem "Footprints," which has been recounted in many versions and is of disputed authorship.

The basic idea of the poem is that the narrator looks back at scenes of their life and sees two sets of footprints, their own and those of Jesus. During the most difficult times of their life, the narrator sees only one set of footprints and assumes that Jesus had left them during those times. In the climax of the poem, Jesus responds to the narrator that they saw only one set of footprints during the most difficult times of their life because Jesus was carrying them during those times.

The poem is seen by many as overly sentimental and is thus ripe for parody of this kind. The graph mockingly illustrates various times when Jesus or the narrator left the scene, or otherwise gives various reasons why the number of sets of footprints may have been other than two.

There are several odd events listed in the chart:

- The narrator of the original poem does not need to carry Jesus.[citation needed]
- "That guy" refers to a mysterious person joining the narrator and Jesus on their walk. It is unclear if this person is paranormal or just some random guy tagging

along.

- "Ducklings imprinted on Jesus and followed Him around" is a reference to Konrad Lorenz's experiments. Three ducklings followed Jesus and the narrator.

- "Jesus disappeared for an evening each time a new Twilight movie came out" could mean that Jesus went to see the movie and left the narrator alone. It could also mean that his support of people through their most difficult trials meant he had to carry a lot of emotionally scarred people.

- "Got lost and followed our own footprints" may be a reference to "Winnie-the-Pooh" (1926), in which the titular bear and his friend Piglet try and hunt a "Woozle" by its footprints, actually following their own round and round a spinney, which also seems slightly childish for Jesus as traditionally portrayed. An alternate explanation is that they came to a dead end, and had to double back.

- "Rode around with Jesus in captured AT-ST" is a reference to a two-legged combat "walker" from Star Wars. The implication is that Jesus would have participated in forcibly taking a war machine, which appears somewhat out of character to those who have not read the Book of Revelation.[citation needed]

In the end, Jesus drowns in a patch of quicksand, and then the narrator simply goes home, again subverting the poem's earnestness. Quicksand can occur on beaches and can be dangerous to humans. If Jesus can leave footsteps in the sand, clearly he is applying pressure and could sink

deeper. "Going home" could be a reference to dying, implying that the narrator died without Christ, the journey at an end. However the narrator probably just went home.

The title text continues the parody by imagining that Jesus delivers the poem's climactic lines in stereotypical "bro" speak, a dialect perceived by many to be obnoxious. "There's one set of foot-p's cause I was totes carrying you, bro!" can be translated into normal English as "There's one set of footprints because I was definitely carrying you, friend!".

The narrator punching Jesus is another subversion of the poem's perceived excessive sentimentality. One interpretation is that the narrator, like many people, dislikes usage of this lingo and punched Jesus as a result of this hatred. Another interpretation is that Jesus' obnoxious way of explaining himself indicated dishonesty, meaning he did not in fact carry the narrator during the most difficult parts of his life. The narrator sensed this and punched Jesus in retaliation.

An alternate explanation of some of the oddities of the strip is that "Jesus" is not Jesus Christ, but some guy merely named Jesus, as is common in some Latin American countries.

Using the Twilight movies as reference points, it can be determined that the span of the graph is from approximately early 2004 to late 2018, with Jesus' death in the second half of 2017.

The poem has appeared in xkcd before, at 1110 with coordinates 0.7601, -58.803.

#1576: I Could Care Less

September 11, 2015
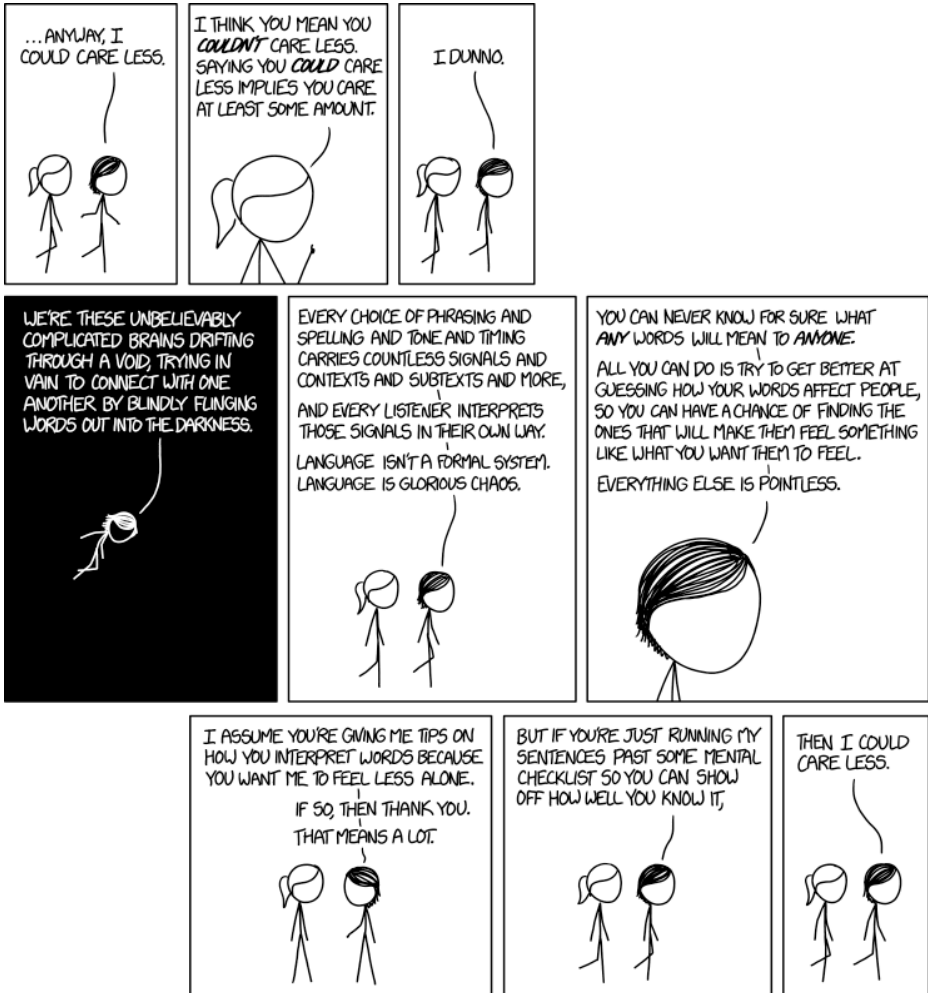
I literally could care less.

Explanation

However, linguists point out that the strict application of logic to an idiom is inappropriate: many expressions seem on the surface to mean the opposite of the meaning they are used to convey (e.g. "head over heels"), and they defend "I could care less" on those grounds. The psychologist Steven Pinker argues in The Language Instinct that the phrase is sarcastic (cf. "Big deal!"), while linguist John Lawler explains it as a "Negative Polarity Item," a phrase that is practically only used in negated form, allowing the explicit negation to be omitted (a pattern often found in French).

In this comic, Megan feels alone because there is unavoidable difference between her understanding of her own words and the listener's interpretation, so while she sees discussion of semantics as being of potentially high social and emotional value, she doesn't think it has objective value. However, ironically, at the end of the comic, the meaning of "I could care less" with regards to Ponytail's behavior is ambiguous: either Megan is brushing off Ponytail's pedantry because she doesn't care about it (she couldn't care less) or she is hurt by Ponytail's focus on the details of her words rather than the emotional cues she should have learned over the course of their relationship (she actually could care less).

The title text refers to another word often used in ways some consider incorrect: "literally" (see 725: Literally). The sentence is also ambiguous, as it may mean that

'literally' or 'figuratively,' the speaker could or couldn't care less. Further, it implies that Randall considers the argument over whether literally may be properly used to mean 'figuratively' is petty in the same way. Later in 1735: Fashion Police and Grammar Police Ponytail is once again on the side of the grammar police and also in this comic the word literally is used.

Alternatively, it could mean that Megan cares too much about Ponytail's correction, considering her response to it.

In a further alternative, the title text could amount to a self-ironical evaluation on Randall's part to the effect that he himself might be devoting too much of his time and energy to the meaning of the phrase in question, as evidenced by the comic itself.

The inverse image of Megan floating through space in the fourth panel, as well as her long introspection, is a reference to the five-part "Choices" series, starting at 264: Choices: Part 1.

#1577: Advent

September 14, 2015
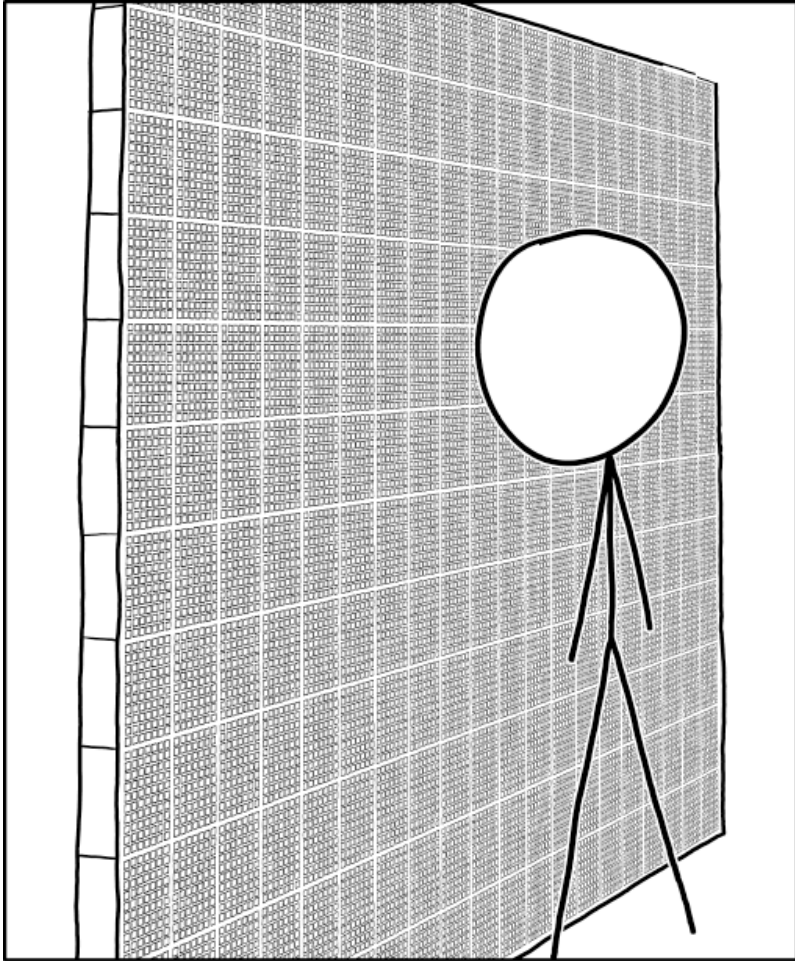
UNSETTLING GIFT: LIFE EXPECTANCY ADVENT CALENDAR

The few dozen doors that have little Christmas trees on them are a nice touch.

Explanation

An Advent calendar is usually a means of celebrating the days before Christmas. Each day on the calendar is represented by a "door" (a flap of card), behind which is usually a picture related to the Christian nativity, a picture of commercial Christmas (e.g. a present), a small chocolate, or a small gift. This comic satirizes the concept by proposing such a calendar that would have one gift for each day one is anticipated to live. Such a calendar would be very morbid and existential. This is especially disturbing when given as a gift because it implies someone has put extensive thought into when the recipient will die.

In Cueball's case, assuming each square in the calendar represents one day, the wall he is facing is the entire present he received and the boxes just out of view follow the same pattern, the entire wall represents 16,800 days (a large grid of 20×12 smaller grids of 7×10 boxes: 20×12×7×10 = 16800), i.e. just under 46 more years (16800/365.25 ≈ 45.99589).

Assuming that Cueball is a male from the US and the grid represents his life expectancy, according to American Official Social Security Actuarial Life Table for males, he is probably 31.9 years old. This would make Cueball almost exactly one year older than Randall, who was born October 17, 1984 making him 30.9 years old when he wrote this comic. Due to the non-linear shape of the mortality curve, the chance of Cueball making it

to the end of his calendar is 57.7%, at which point he will need to get another calendar but with only 9.2 years worth of doors.

The title text refers back to a standard advent calendar by saying that the Christmases are specially marked; on a traditional Advent calendar, only the 1st to the 24th of December have doors, however in recent times, Advent calendars often also include an additional door for the day after Advent, Christmas Day. A few dozen may be any small number of dozens, and 3 5⁄6 dozens (46) is aptly described by a few dozen; see 1070: Words for Small Sets. Any dictionary (for example Oxford Learner's Dictionaries) says that a dozen may be an approximate number, not exactly 12.

A completely different advent calendar was mentioned in 994: Advent Calendar, and yet another kind of advent calendar in 2550: Webb.

Similar calendars have been mentioned in the blog Wait But Why in the 2014 post Your Life in Weeks, and in equally geeky webcomic Abstruse Goose, in the 2008 post 936 Little Blobs.

#1578: Squirrelphone

September 16, 2015
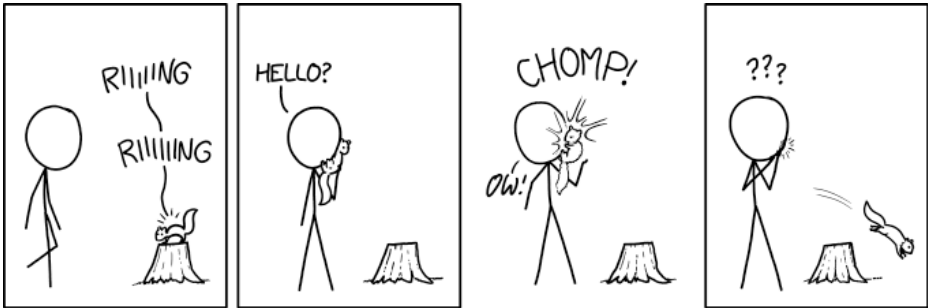
After a while, the squirrel starts making that beeping noise and doesn't stop until it hops back up onto the stump.

Explanation

"Squirrelphone" is a compound word combining "squirrel" and "phone".

In this comic, we see a squirrel pretend to be a telephone, only to bite Cueball when he tries to pick it up and use it as one. This is humorous because a living squirrel making a ringing sound is completely absurd, but when Cueball attempts to lean into this absurdity by answering, the comic subverts your expectations with the more realistic outcome of being bitten.

The sounds the squirrel makes correspond to the tones that the terminals make when you use the POTS (Plain Old Telephone Service) in the US:

- When someone else calls you and the receiver of your phone is on the hook, the phone makes loud and long "riiing riiiing" tones. This is the case in the first frame of the comic.
- If a phone is left off hook without use for too long (referenced in the title text), an off-hook tone is played. This is to alert anyone present that the phone is off-hook. In this case, you should hang up so that you can receive calls. Once on-hook, the receiver can be picked up again to dial. In this case, this means having the squirrel back on the stump.

Squirrels are a recurring theme in xkcd. They also appear in what if?, where it has for instance been used as a cute

animal to replace a drawing of something scary or unpleasant like in the articles Blood Alcohol or Cannibalism.

#1579: Tech Loops

September 18, 2015
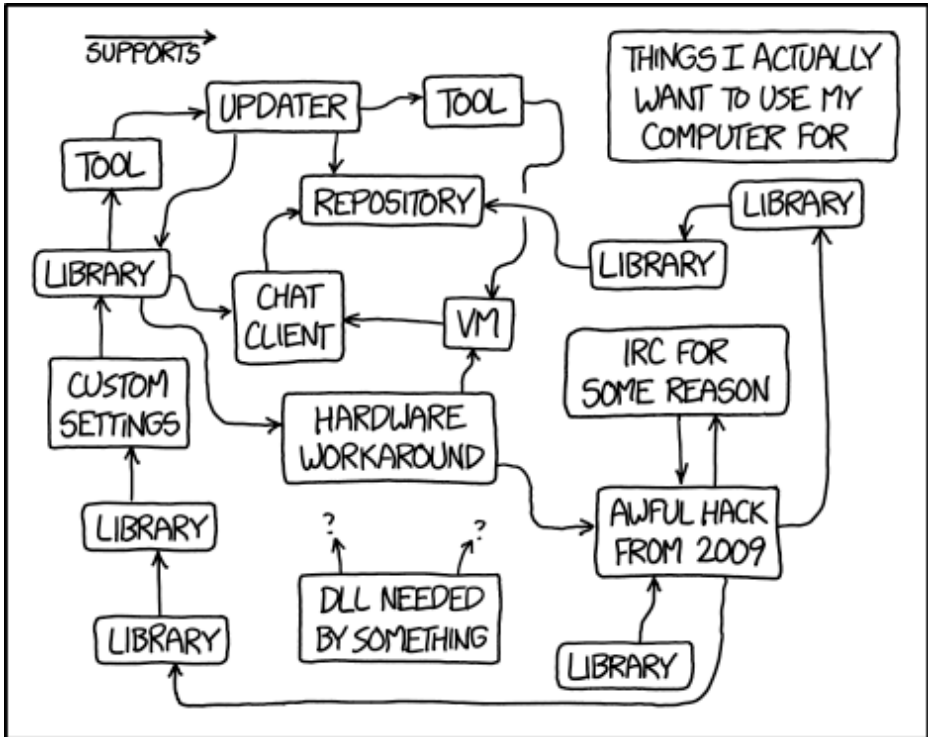
EVERY NOW AND THEN I REALIZE I'M MAINTAINING A HUGE CHAIN OF TECHNOLOGY SOLELY TO SUPPORT ITSELF.

And when I think about it, a lot of "things I want to do" are just learning about and discussing new tools for tinkering with the chain.

Explanation

The comic is about how much time a geek might spend on a computer just to maintain the system itself, rather than actually using it for something relevant. This can in the worst cases go all the way up to the point where maintaining the system becomes the main goal. Often the operating system (OS) needs periodic updates, which might break some apps which in turn need to be updated; apps themselves might need to be updated, which can create all sort of incompatibilities which the geek then needs to spend time fixing. One term for this is "dependency hell".

Most people consider computers as tools to achieve something else — e.g. to surf the web, play games, read news or balance their bank account — and they would rather not have to spend lots of time on maintaining the OS or the computer if they can avoid it. Here, however, Randall finds he's spending most of the time using his computer just for the sake of maintaining the OS or the hardware on said computer. It's tools for the sake of tooling, rather than tools as helpers to build something else. A hardware equivalent would be the RepRap Project: get a 3D printer and end up spending all the time printing 3D parts for itself instead of creating something else like toys or art.

An alternative interpretation is how a simple task can get maddeningly tricky because of the inherent complexity of the system. An example of this appears in 949: File

Transfer, where the simple task of sending a file from one computer to another gets practically impossible despite having all kinds of cloud tools available, many of them designed to perform much more complex tasks with one simple click. In this view, the box labeled "things I actually want to use my computer for" could refer to simple actions like transferring a file and all the rest of the graph are unsuccessful tiring attempts to solve the problem by installing increasingly complex tools which end up not solving the simple problem properly. This is similar to this traditional programming joke. Other comics about the same concept are 349: Success and 763: Workaround.

In the title text Randall realizes that what he really wishes to do it often only to learn about and discussing new tools to improve the chain. So in this way it is for sure only a system to support itself. But on the other hand, then the box with things he actually wishes to use the computer for, is then not disconnected from the rest, but an integral part of it all.

#1580: Travel Ghost

September 21, 2015
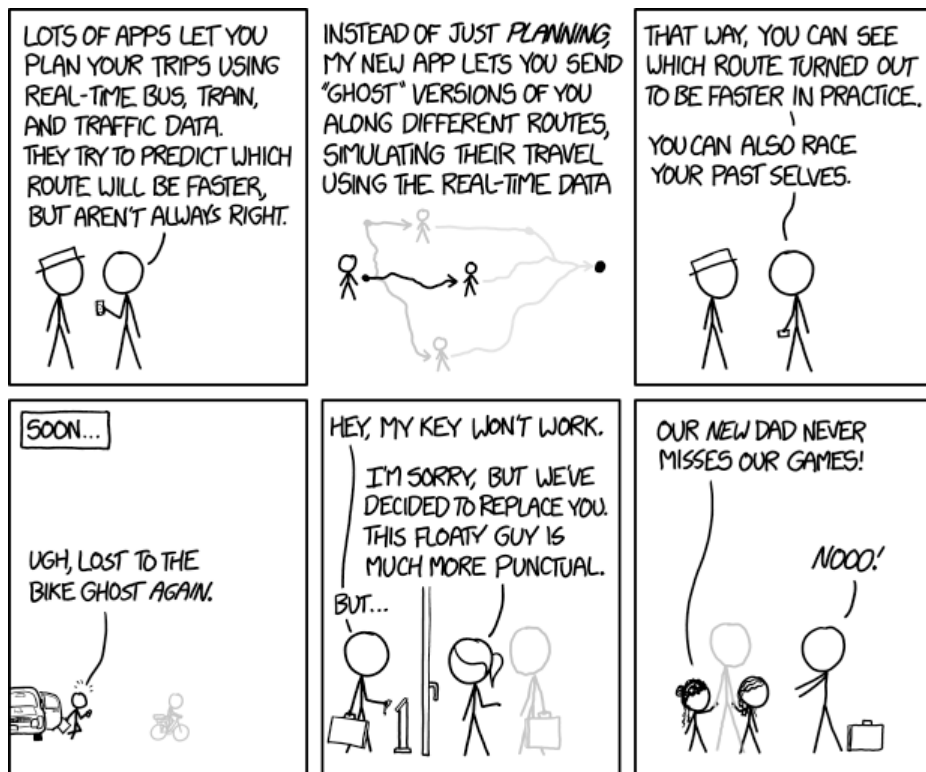
And a different ghost has replaced me in the bedroom.

Explanation

In racing game, a "ghost" is a common term for the recording of a player's best actions. The recording is used to create a virtual racer that another player can compete against. The previous player is shown as ghostly and transparent, because it is only a recording of a previous game and it does not interact in any way with the game currently being played. Certain models of cycling also use this concept to motivate athletes while training.

A mapping app, such as Google Maps, attempts to plot the fastest route from one place to another, but there's no way to tell which route is really the fastest without testing it. So, Cueball has created an app that will simulate a number of different routes and produce "ghosts" from them. He hopes to use this app to discover the fastest route by competing against his ghosts like a racing game. He brags about this app to his friend White Hat.

However, the comic takes a turn for the absurd when it depicts actual ghosts competing with him, instead of simulations on his phone. Soon enough, he is fired from work because one of his "ghosts" is more punctual than he is. And even worse his children apparently comes to prefer the more punctual "ghosts" over him as this version of daddy never misses their games. (The girls could be the same as those in the 1659: Tire Swing).

In the title text this is even taken into the bedroom,

although it is a different ghost than the one preferred by the children. This is likely a subtle reference to euphemisms for sexual climax, such as "arrival", with delayed ejaculation generally preferred.

It should be noted that this app would not guarantee the minimum travel time. The user doesn't find out which route was fastest until after the first ghost has arrived. But as the current traffic situation will have changed by then, that route will not necessarily still be the fastest.

XKCD TURNS 10 YEARS OLD THIS MONTH.
IN LIGHT OF LAST NIGHT'S COURT RULING IN
RUPA MARYA v. WARNER/CHAPPELL MUSIC INC,
I WOULD JUST LIKE TO SAY:

♫ HAPPY BIRTHDAY TO YOU ♪

HAPPY BIRTHDAY TO YOU

HAPPY BIRTHDAY, DEAR XKCD

HAPPY BIRTHDAY TO YOU

I guess I need to apologize to my parents, friends, and the staff at Chuck E. Cheese's for all the times I called the cops on them.

Explanation

xkcd turned 10 years old on September 30, 2015 (a week after the release of this comic). In this comic Randall honors his webcomic by singing to it the classic "Happy Birthday to You" song.

"Happy Birthday to You" is one of the most commonly sung songs in the English language (and is common in many others). Because of its age, ubiquity, and simplicity, it has long surprised people to learn that it was not in the public domain. Warner/Chappell Music claimed the copyright to the lyrics, and has demanded royalties for any recording, publication or public performance for commercial purposes. Total revenues for this song were estimated at US$2 million annually.

This strip refers to a court ruling from the day before the release of this comic, by a federal judge in California (George King), stating that the song is not covered by valid copyright (see Warner's 'Happy Birthday' Copyright Not Valid, Judge Rules). This ruling resulted from a lawsuit filed by Good Morning To You Productions (singer Rupa Marya and filmmaker Robert Siegel) against Warner/Chappel Music to declare Warner/Chappel's copyright claim in the song invalid (filing at). With this ruling, the court declared that Warner/Chappell does not have a copyright claim to the song, and therefore the song can now be sung or published by anyone, in any context, without having to pay royalties to Warner/Chappell.

The ruling does not go so far as to declare the song to be in the public domain, leaving it more correctly defined as an orphan work. Randall seems to be celebrating the fact that this strip, which would have put him at risk for a lawsuit the day before, is now unlikely to be challenged since the odds of a new party appearing and successfully claiming copyright on the lyrics and subsequently demanding license fees is approximately zero.

Chuck E. Cheese's is an entertainment restaurant, geared toward young children, which routinely hosts birthday parties as part of its business model. Parties held in commercial venues tend to be a gray area for this kind of issue. Singing copyrighted songs at a private function is allowed, but the staff of a restaurant singing them to patrons could be considered a commercial performance, and potentially expose the restaurant to claims from the copyright holder. The title text suggests that Randall was at a family birthday party, witnessed someone (possibly the staff) singing "Happy Birthday", and called the police. This would be an extreme overreaction in any case (even if it were a violation, copyright infringement is a civil liability, not a criminal offense), but the decision that the copyright wasn't valid in the first place makes such an action even more indefensible.

#1582: Picture a Grassy Field

September 25, 2015

PICTURE A GRASSY FIELD.

IN THE CENTER SITS A SMALL, PALE, BIG-EYED CREATURE WITH THE POWER TO ESCAPE FROM ANY VISUALIZED SCENE AND MOVE FREELY THROUGH THE BRAIN THAT IMAGINED IT.

IT GLANCES AROUND NERVOUSLY AND—

—WHOOPS, WHERE'D IT GO?

SORRY ABOUT THAT! KEEP AN EYE OUT FOR IT IN YOUR DAYDREAMS.
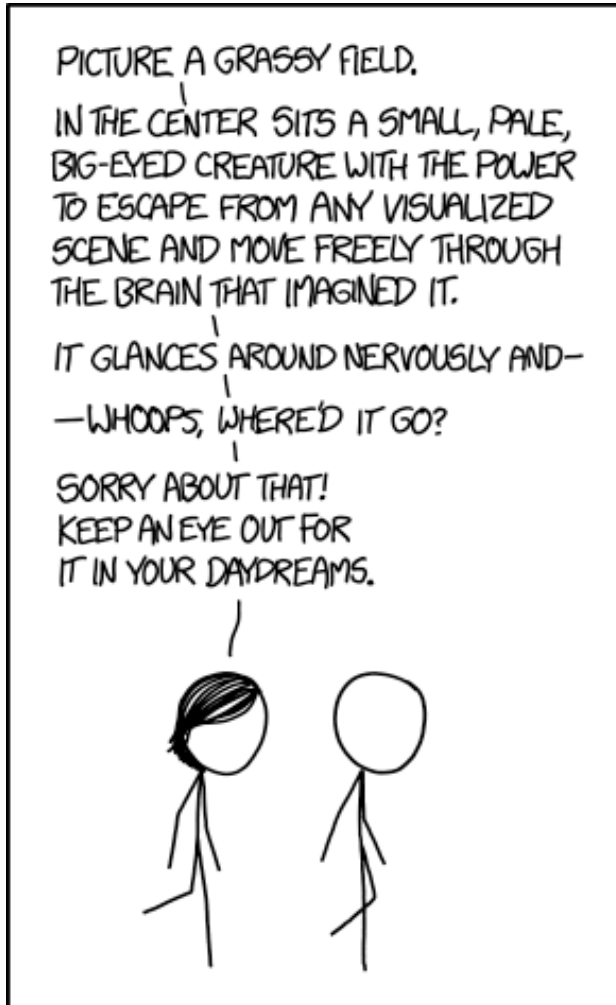
Wait, I can fix this. Picture another field. In the middle sits the only creature the first creature is afraid of. Now just-- wait, where did **THAT** one go?

Explanation

In this comic Megan asks Cueball to picture himself in a grassy field. It is a standard technique to begin a visualization by asking the person to imagine that they are in some calm environment (could be for any kind of meditation/mindfulness like for instance yoga). A grassy field could have been replaced by a beach at the sea, or a forest with sunbeams coming down through the trees.

Proceeding with the visualization Megan asks Cueball to imagine a creature with the power to be able to escape from any visualized scene, and then tries to convince him that this creature has indeed escaped from his current visualization as it indeed would be able to do. She then proceeds by apologizing for this but then tells him (warns him) that it from now on might appear in Cueball's daydreams, so he should begin looking out for it. This indicates that she is not at all sorry, but did this intentionally to try and mess with Cueball's head. The idea of the possibility of escaping an imagined situation was already used in 248: Hypotheticals. Now that Megan has introduced both the idea of the creature and the idea that it may appear in his daydreams, Cueball will almost certainly think of it from time to time, creating a self-fulfilling prophecy.

In the title text Megan proposes a solution to get rid of the creature in Cueball's daydream, namely by picturing the only creature that the first fears. However, if this new (maybe quite scary) creature should be able to pursue the

original creature, then it would also have to be able to move through visualized scenes just as easily. And this is what Megan pretends happens again. So now the problem is that Cueball has two creatures on the loose in his daydreams. And even if the second scares the first away, he would then still have the new one to worry about.

#1583: NASA Press Conference

September 28, 2015
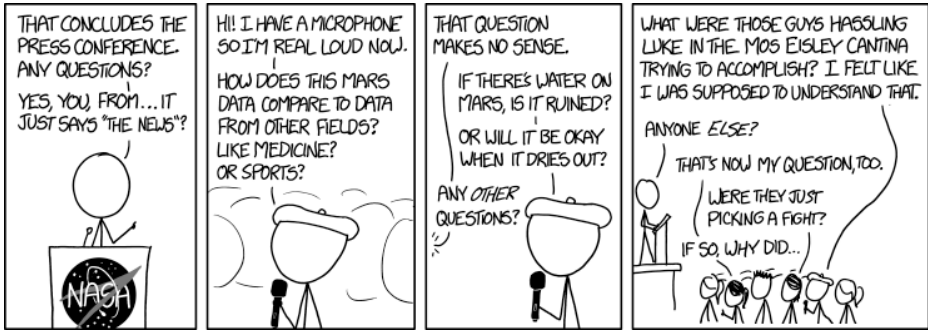
Why are we spending billions to ruin Mars with swarms of robots when Elon Musk has promised to ruin Mars for a **FRACTION** of the cost?

Explanation

This comic is a reference to the press conference held by NASA on 28th September 2015, (the same day this comic was published), which confirmed the existence of liquid water at the surface of Mars. The comic was posted before the NASA press conference was held, although speculation about the announcement had already occurred.

The "questions" portion of the press conference is derailed by Beret Guy, acting as a reporter for a network known only as "The News". He first comments he is holding a microphone so he is "real loud now." He then asks how the data about Mars relates to data in other fields like medicine and sports. This may seem like an intelligent question upon first glance, but it is in fact nonsensical. Afterwards he asks if Mars has been "ruined" by getting wet, or if Mars will be okay when it dries out. Some things, e.g. indoor furniture, can be damaged by water, but Mars is not one of those things.[citation needed] When asked if he has any other questions he asks why Luke Skywalker was being hassled at the Mos Eisley Cantina in Star Wars. (Dr. Evazan and Ponda Baba simply told Luke that "[they] don't like [him]", but Beret Guy is evidently not satisfied by that explanation.) Although this may be somewhat space-related, NASA is not an organization that explains films, whether or not they are space related. The other reporters forget their original questions and join in on the irrelevant discussion, much to the dismay of the

NASA scientist.

This is probably meant to mock previous NASA press conferences, where reporters have asked inane questions that reveal their total ignorance of the field.

The title text refers to Elon Musk, who suggested nuking Mars as a faster way of warming it up to make it habitable.

#1584: Moments of Inspiration
September 30, 2015

Charles, I just talked to John and Mildred, who run that company selling seeds and nuts, and their kids with MOUTHS are starving!

Explanation

Isaac Newton's original examples describing the force of gravity show an apple falling from a tree in order to explain why the apple falls toward the Earth, instead of the Earth falling toward the apple. He is often said to have been inspired by watching falling apples; in common folklore, this developed into the legend that he was actually struck by an apple. The first part of this comic retells that famous legend. The later panels depict similar (but more and more implausible) legends that could emerge if we were to assume that other scientists' most famous examples and discoveries were based on actually observing some mundane everyday event taking place.

In the first situation, we not only see the apple fall on Newton's head, we also see the Moon. This was one of the first astronomical objects on which he used his theory of gravity. He calculated its orbit around the Earth and found that it fit with the theory.

In the second situation, Cueball throws a baseball towards Lise Meitner, but when she fails to catch the ball it hits one of her porcelain model-atoms. In this way, Meitner discovered a way to split the atom. Cueball may represent Otto Hahn, since they were part of the Hahn-Meitner-Strassmann team that worked on this problem. Hahn was later awarded the Nobel Prize for Chemistry, where Meitner was overlooked. Throwing something at someone and asking them to think fast is a

common "joke", where the receiver rarely has a chance to actually catch the object. But in this case, it could also be a reference to the fact that she then thought fast then made a major discovery. Or if it is Hahn, then he thought faster and got the award instead of her. The porcelain models might also be a reference to Meissen porcelain, in German called "Meißner Porzellan", where "Meißner" is phonetically very similar to "Meitner". Meitner has previously been mentioned in the comic 896: Marie Curie, which more or less explains why Randall did not choose the more famous Marie Curie as the female example in this comic. Meitner is not very well known in the public, compared to the three men or Curie, but this may exactly be the point for choosing her. She should have been just as famous considering what splitting the atom has led to. Also, there's not much in Marie's story that could be put down to fanciful anecdotes. "All" she did was extract a few chemicals and study their properties.

In the third situation, it is indicated that half of Charles Darwin's children had beaks, a property not normally found in human children.[citation needed] This would make it very difficult for them to drink soda from a glass or through a straw, compared to his normal children with mouths. Based on this observation he developed his ideas about natural selection and evolution. The comic is unclear on whether this makes them more or less fit to survive and reproduce. This is a reference to Darwin's initial findings on the HMS Beagle on how Galapagos finches with differently shaped beaks are better suited for

specific types of food and therefore are better selected for in environments where those foods are available. The title text furthers this, see below. Darwin later in life feared that, having married his cousin, their consanguinity would increase the risk that his children would be born with birth defects (although he did not fear that they would be born with beaks). The difficulty caused by beaks when drinking liquids could be a reference to the Aesop's fable The Fox and the Stork.

In the fourth situation Albert Einstein remarks to a man that it's annoying that the man's twin brother keeps flashing a light from a train when Einstein is trying to check his clock. He then comes to a sudden revelation. This references several of Einstein's (different — they make little sense together in this manner) thought experiments on special relativity, such as the twin paradox (the twin on the train should be younger after decelerating to a stop), a clock built from a beam of light, the time dilation experienced by the observer in the moving frame of reference, and the various constructs involving trains and light(ning) flashes used to illustrate the relativity of simultaneity.

The title text shows that beaks rather than mouths are more useful for eating foods that have shells that need to be cracked open before eating like nuts and seeds. Here it is clear that in the John and Mildred family you starve if you cannot eat such foods, and thus it's an advantage for survival to have a beak instead of a normal mouth. "John" and "Mildred" may be Mildred and John T. Scopes of the famous 1925 "monkey trial" in which John was fined

$100 for teaching evolution in a Tennessee school.

#1585: Similarities

October 02, 2015

SO IT'S A WORK OF FICTION ABOUT A WELL-KNOWN BRAND, WRITTEN ON THE INTERNET BY AN ENTHUSIAST, REPUBLISHED AS A BESTSELLING BOOK, AND THEN MADE INTO A BIG MOVIE.

YUP.

YEAH, *THE MARTIAN* AND *FIFTY SHADES OF GREY* ARE BASICALLY THE SAME BOOK.

"*FIFTY SHADES OF RED?*"

MAN, *TELL* ME YOU WOULDN'T READ THAT.
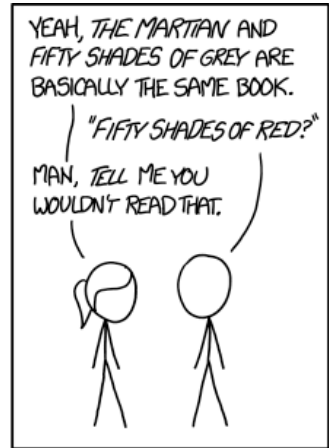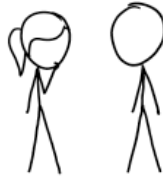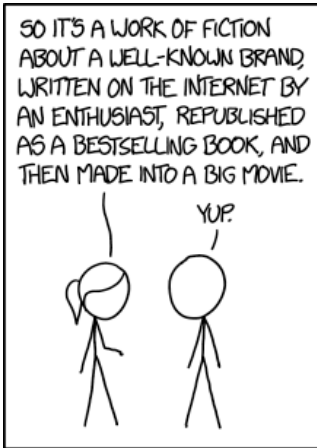
I just came from The Martian, and I just have to say: Forget BB-8; I want a pet Sojourner! It's always been the cutest of our Mars rovers.

Explanation

There's a common punchline in which the plot lines of two thematically-different works of fiction (usually movies) are compared in greatly-abbreviated form, and the speaker sarcastically concludes that the two movies are "basically the same". For sake of example, Disney's Aladdin and James Cameron's Titanic both feature a story in which a lower-class boy and an upper-class girl fall for each other, among other cherry-picked yet interesting parallels. But due to the different emotional tones of the films, most people would not consider them to be at all similar (one is a family-friendly "happy ever after" tale and the other is a period romance that turns into a disaster thriller).

This comic spoofs the idea. Instead of comparing plot lines of two movies, Ponytail and Cueball compare the respective movies' development histories. The Martian was originally a serialized story written by Andy Weir on his blog which was later compiled into an ebook for people to easily download, then published into a physical book, and has now had a movie created based on it. The movie was officially released in the US on the same day this comic was released (October 2, 2015).

Fifty Shades of Grey began as a fan fiction of a well known brand (the Twilight book series). It was originally written on the internet by E. L. James. It was then transformed into a successful book series which was later turned into a movie released in February 2015. The book

was already referenced back in 2012 in 1128: Fifty Shades. Since Fifty Shades is a romance story about a sadomasochistic relationship, and The Martian is a very technical story about surviving completely alone on a hostile planet, the two books could not be any more different, hence the joke due to the juxtaposition.

Cueball continues the joke by joining the two titles using red for Mars, to make a new book title, that should cover both books: Fifty Shades of Red. Ponytail says to Cueball that such a book would be irresistible for him. She does this by daring him to say that he wouldn't read it, believing he could not say so without lying. It is possible that the brand that The Martian derives from is NASA itself. The Martian has been compared to the film Apollo 13 by Randall in 1536: The Martian. Apollo 13 does indeed glorify the roles of the NASA engineers, and The Martian does a similar thing. That Randall would go see this movie as soon as it was released was already made perfectly clear back in June when he released the comic 1536: The Martian showing how excited he is about the book. He then really looked forward to the movie.

Randall indicates in the title text that he has just seen the movie (certainly possible, if he caught a midnight screening; perhaps he drew this comic in advance and wrote the title text after) and finds the Sojourner rover adorable. Of course, he could also have seen it in the trailers. The BB-8 mentioned in the title text is the astromech droid from the movie Star Wars: The Force Awakens and is available as a toy (see also BB-8 on the official Star Wars home page). Sojourner was the Mars

Pathfinder robotic rover. Mark Watney, the main character of the book, had the rover and let it wander around like a space puppy.

Randall indicated that he thinks the Sojourner is much cuter than BB-8, and that he would like to have one as a pet. He then states that the Sojourner has always been the cutest among all the Mars rovers. The cuteness of Mars Rovers is also mentioned in 2433: Mars Rovers. There have been five so far, the other four being Spirit, Curiosity, Opportunity, and Perseverance, three of which have already been used in xkcd comics: 695: Spirit, 1091: Curiosity, and 1504: Opportunity.

#1586: Keyboard Problems

October 05, 2015
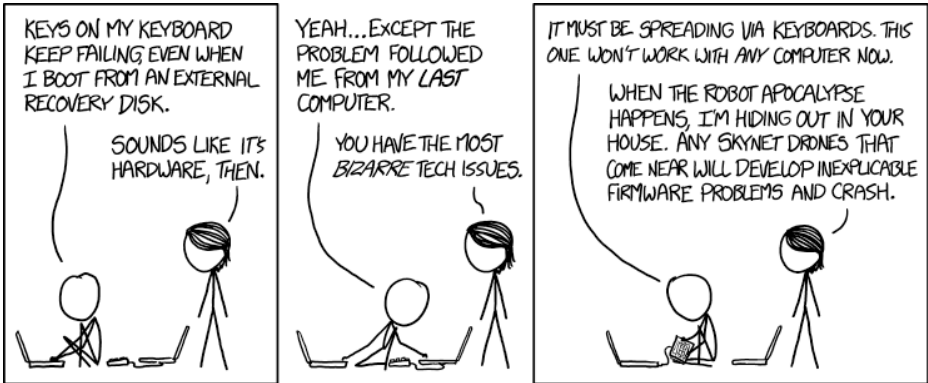
In the future, a group of resistance fighters send me back in time with instructions to find the Skynet prototype and try to upgrade it.

Explanation

Cueball and Megan are trying to solve a keyboard issue, but are puzzled and baffled by the symptoms.

In the comic, Cueball complains that some keys in his keyboard don't work. Generally speaking, this could be due either to a software problem (e.g. the keyboard driver not working properly, or some program ignoring keypresses) or to a hardware problem (the keyboard is physically damaged, e.g. because of dirt under the keys).

If the problem is in the software, booting from a different operating system (e.g. an external recovery disk) should solve it, as the computer would no longer be using the faulty software. However, if the problem is in the hardware, changing the keyboard should solve the problem as the new keyboard should be physically undamaged (i.e. would presumably have no dirt under the keys).

However, the problem stays there after booting from an external recovery disk (so it's not a software problem) and it has "followed Cueball since his last computer," (i.e. the problem persists after changing to a new laptop with a new keyboard, so it's not a hardware problem). Cueball is (reasonably) puzzled.

Megan seems to be used to Cueball's computer behaving strangely, and she doesn't even attempt to explain or solve the problem. The only explanation she needs for

the problem is that "it's Cueball's computer." The characters in this comic are probably the same as in 1084: Server Problem, 1316: Inexplicable, and 349: Success.

The last panel is a reference to The Terminator, a 1984 movie often referenced in xkcd. In the movie, the artificial intelligence named Skynet initiates a nuclear war, destroying most of humanity, then sends killing machines to finish the rest. These include flying drones — Megan suggests that if such robots come to Cueball's vicinity, they will (physically) crash since computers around Cueball can't seem to ever work properly, and so hiding in Cueball's house she should be safe from the robots.

The title text refers to main plot of the movie and its sequel Terminator 2: Judgment Day. As Skynet's army is losing the battle against the human Resistance movement, it finds a way to send a humanoid robot T-800 back in time to kill the mother of the Resistance's leader. The Resistance in turn sends Kyle Reese back in time to protect her. In the sequel, the situation repeats with the more advanced T-1000 being the killer and a reprogrammed T-800 being the protector of the child (the future leader). Along the way, they manage to destroy the research lab where Skynet hardware is to be born in the future. The title text suggests an alternative mission into the past, sending Cueball back in time and using his power to cause Skynet to terminally malfunction instead of destroying it physically (as Skynet was created later anyway, despite the destruction of the research lab).

October 07, 2015

MY FOOD RULE:

RED MEAT ✓
PORK ✓
POULTRY ✓
FISH ✓
SHRIMP ✗
OYSTERS ✗
SQUID ✗
FRUIT ✓
VEGETABLES ✓
GRAINS ✓

I WON'T EAT SOMETHING
IF I HAVE TO GOOGLE
TO FIGURE OUT WHETHER
OR NOT IT HAS A FACE.

I won't eat invertebrates, because I can fight a skeleton, but I have no idea what kind of spooky warrior a squid leaves behind.

Explanation

There are various vegetarian diets which restrict certain foods for ethical or personal concerns. The traditional standard for vegetarianism is not eating any kind of meat, but some people consider themselves to follow a form of vegetarianism, while still eating specific meats, such as poultry or fish, or meat from specific sources (such as roadkill). On the other hand, vegans typically go further, and refuse to use animal byproducts, such as eggs and milk, and even honey.

Some vegetarians follow a more capricious rule: don't eat anything with a face. This is likely, at least in part, a facetious response to demands over where the line should be drawn: if cows and pigs deserve life, what about mosquitoes, and worms, and bacteria. This standard sidesteps the whole argument by declaring that anything that looks vaguely similar to people (since faces are the main way we identify people) are enough like us that they deserve at least some protection.

Randall presents an alternative rule: I won't eat something if I have to Google to figure out whether or not it has a face, and presents a list (see details below) of allowed and forbidden food in his diet. For the most part, this consists of a typical omnivorous diet. He'll eat things that obviously aren't animals, like fruits, vegetables and grains, and he'll eat meat from typical livestock, like cows, pigs and chickens, but the section in the middle, consisting of ocean-dwelling invertebrates, is off-limits

him. The implication is that animals without an obvious face are strange enough to be off-putting. Rather than basic dietary restrictions on ethical or health considerations, this bases them on familiarity and perceived weirdness.

The title text gives another rule that also would make these same three omissions. This rule is about not eating invertebrates (animals without a vertebral column, i.e. spineless creatures). All of the foods he's willing to eat are either vertebrate animals or plants. His reason for avoiding invertebrates is somewhat outlandish: he fears that the spirits from creatures he has eaten will come back to haunt him. In horror stories, undead creatures often appear as spooky skeletons. Randall apparently doesn't find such skeletons overly concerning (insisting that he can fight them), but being haunted by something unknown is too much. Restricting your diet based on fear of being haunted is an even more unusual strategy.

The comic may also be a joke on the modern paleo diet trend, which emphasizes eating fruit, vegetables, and meat ("anything with a face").

Randall has previously depicted cuttlefish as spooky in 520: Cuttlefish, and he's also mentioned his dislike of certain foods (namely lobster - another invertebrate) in 1268: Alternate Universe.

Items on the list[edit]

Here is a list with explanation for each item on Randalls food list:

- Red meat, includes meat from most adult mammals, but many people will probably think of beefsteak from cattle.

- Pork, is meat from pigs. While technically a "red meat" (according to the US Department of Agriculture) it is popularly considered "the other white meat", hence its own bullet point.

- Poultry are domesticated birds; most people will think of chicken.

- Fish covers a very large group of animals, most of them are not eaten on a regular basis, but a large group of fish are used as food.

- Shrimp is used to refer to ten-footed crustacean and some of these are used for food. In the UK they often go under the name prawns. Shrimps can have quite prominent eyes, but their visage is otherwise difficult to describe, with multiple organs and antennae not present in vertebrates. However, many pictures of cute shrimp faces can be found on Google Images.

- Oysters refers to a family of mollusca within the class bivalvia (i.e. body enclosed in shells consisting of two hinged parts). Most people will probably think of the true oysters specifically the edible oyster, which are not the only edible oyster!. Note that the pearl oyster is not a true oyster. Oysters do not have eyes, and its mouth is difficult to find, so it is easy to argue it does not have a face.

- Squid are cephalopods (also of the mollusca family) with eight arms arranged in pairs and two longer tentacles. They are closely related to cuttlefish and octopuses. Although squids have very prominent eyes, their beak tends to be obscured by long tentacles, giving squids an elongated visage with few recognizable facial features.

- Fruit is a part of a flowering plant. Common fruits are apples, oranges, bananas and pears. But in principle anything that comes from a flower is a fruit, including grains. Although in a culinary sense there is a distinction between vegetables and fruit, any part of a flower is actually a vegetable. See below and also see 388: Fuck Grapefruit.

- Vegetables are any kind of plant. But in everyday it refers to any part of a plant that is consumed by humans as food as part of a savoury meal, thus excluding fruit, nuts and cereal grains. For instance a tomato would be seen as a vegetable due to its taste and as a fruit botanically – see the Venn diagram here.

- Grains are small, hard, dry seeds. Usually when mentioning these people will think of breakfast cereal grains. Typical grains are corn, rice and wheat. As mentioned above grains are botanically both a fruit and a vegetable.

#1588: Hardware Reductionism

October 09, 2015
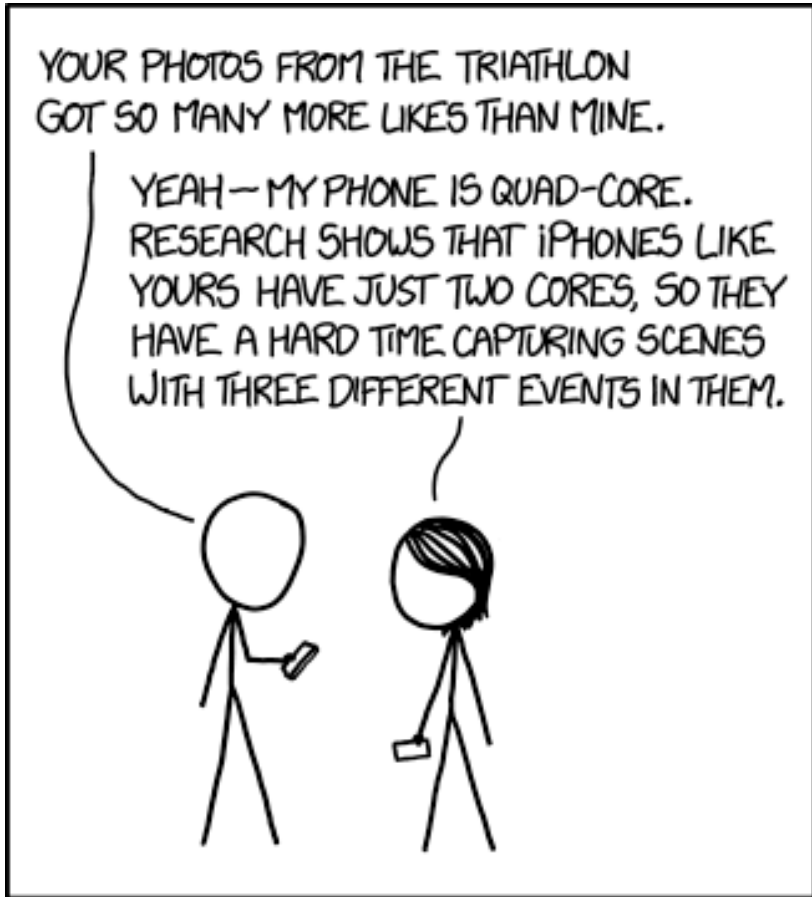
IF WE TALKED ABOUT PHONE HARDWARE
THE WAY WE TALK ABOUT BRAIN HARDWARE

My MRI research shows a clear correlation between the size of the parietal lobe--the part of the brain that handles spatial reasoning--and enjoyment of 3D Doritos®.

Explanation

Reductionism is the belief that things can be explained by their smaller parts. It can be abused when complex phenomena with multiple causes are attributed to a single, simple cause.

Neurological reductionism is the attempt to explain people's behavior and personality by physical features of their brain. With advances in neuroscience, and especially in brain imaging, there's a fad to claim that brain types determine what the mind is. Examples of this kind of bad reductionism would be:

- Male brains have more grey matter than females. Therefore, males are smarter. For an example of criticism of this kind of reasoning, see Male and female brains: the REAL differences (4 December 2013).

- Brains of gay males are slightly more symmetrical, as are female brains, when compared to straight males. Therefore, gay men are fated to be more effeminate. See Gay Men, Straight Women Have Similar Brains (16 June 2008).

- The left side of the brain is associated with logical thinking, and the right, with visual and artistic thinking. Therefore, people divide into "left-brain" or "right-brain" types, depending on how good they are at using each side. See lateralization of brain function on Wikipedia.

There are several problems with this kind of reasoning.

First, most studies identify correlation, not causation (see correlation does not imply causation). Brains are plastic; they can be shaped by experience. For example, if, in a given society, the females are taught to mind their appearance, and the males are taught that aesthetic considerations are unmanly, then of course the female brains will end up with more developed aesthetic centers. In other words, behavior and capabilities aren't always determined by the brain. Sometimes it's the behavior that shapes the brain; sometimes a third factor (e.g., malnutrition) shapes both.

Second, even when the brain is actually a cause of the behavior, it's far from the only piece in the puzzle. Many studies on brain differences are correlation studies, often about very small effect sizes. Unfortunately, the popular science media tends to gloss over the statistical concept of "effect size". For example, imagine a study that says that males' brains are 0.1% more likely than females' brains to exhibit attention deficit hyperactivity disorder (ADHD). Journalists are prone to report it simply as Study Shows that Males Have More ADHD, and this becomes a conversation sound-bite that neglects other factors, like genetics or pregnancy smoking. See also 882: Significant, which does not discuss effect size, but does raise other objections to writing soundbites based on a single study.

Another kind of excessive neuronal reductionism is the overemphasis on brain modules ("scientists identify brain area responsible for religious faith", and the like). Though it's true that the brain has specialized areas, it's also true that the processing is very complex, messy, and

distributed all over. Some varieties of brain damage can often be overcome by learning to use undamaged areas of the brain.

The comic illustrates the problem by analogy to some better-understood general-purpose computing hardware: the CPU in a smartphone. Cueball and Megan have used their smartphones to take pictures of the same event: a triathlon, that is, an athletic competition comprising three modalities (e.g., swimming, cycling, and running). Cueball wonders why is it that Megan's photos are more popular, and Megan gives a reductionist explanation: She tells that her phone is quad-core (four cores) whereas Cueball's phone only has two cores (here she even throws in the typical sentence "research shows that" to make her claim sound more valid). A core is a part of a CPU that executes programming instructions, often described metaphorically as the "brain" of a computer or smartphone. Megan thinks that this means Cueball's smartphone can only capture two events at the same time; to anyone who understands how computers work this conclusion is absurd. She misunderstands how the specialized modules work (for that matter, how a digital camera works at all) and fails to realize that the number of cores is unrelated to how many events can be captured. Her claim is like saying that male brains are better at spatial reasoning, and therefore males are better triathlon photographers, or that females are better at multitasking, and therefore females are better triathlon photographers.

A CPU with more cores could process pictures faster,

speeding up facial recognition or color filters. So it's true that Megan's CPU makes it slightly easier for her to take pictures. However, this has, at best, an extremely small effect on the number of "likes". There's a lot more going on with photography than the CPU of the phone: Megan's photographing skills, her luck in capturing interesting scenes, the number of online friends she has, etc.

So Megan misunderstands many things: the modularity of CPUs, the small effect of the CPU on the quality of her photography, and the actual causes of her success, much like people who reduce ability to structural features of the brain.

The title text is mocking reductionist explanations based on Randall's MRI (magnetic resonance imaging) research. One of the most famous (and disputed) claims about gendered brains is that women's brains are (slightly) worse at spatial reasoning. Doritos is a popular junk-food brand of tortilla chips that are typically so flat that they can be called a 2D snack. In the 1990s Frito-Lay (PepsiCo) introduced a special 3D version, the 3D Doritos. (These bloated snacks took up more surface area in one's mouth, and had a hollow center filled with cheese-flavored air). So the title text associates a larger spatial reasoning brain area with enjoyment of this three-dimensional variation of the popular junk-food snack; the conclusion could be that men like these 3D snacks more than women because of their better spatial reasoning, although there could obviously be several other reasons for such gender specific choice of

junk-food. 3D Doritos were discontinued, but reintroduced in 2015, the year of this comic's release.

#1589: Frankenstein

October 12, 2015

Panel 1:
LIKE MANY PEOPLE, I'M TIRED OF THE NITPICKING ABOUT FRANKENSTEIN'S MONSTER'S NAME.

LUCKILY, FRANKENSTEIN IS PUBLIC DOMAIN.

THEREFORE, I PRESENT

XKCD'S *FRANKENSTEIN* ⚡

(THE MONSTER'S NAME)

Panel 2:
GRAAAR!

FRANKENSTEIN IS ALIVE! I AM A MODERN PROMETHEUS!

RAAAAR!

TO BE CLEAR, YOUR NAME IS FRANKENSTEIN. CANONICALLY.

GRAAAAAR!
THE MOON LANDINGS WERE FAKED!

WAIT, WHAT?

Panel 3:
~FIN.~

THERE.

FEEL FREE TO CALL THE MONSTER "FRANKENSTEIN."

IF ANYONE TRIES TO CORRECT YOU, JUST EXPLAIN THAT THIS COMIC IS YOUR CANONICAL VERSION.

THANK YOU.

"Wait, so in this version is Frankenstein also the doctor's name?" "No, he's just 'The Doctor'."

Explanation

Frankenstein; or, The Modern Prometheus is a novel by Mary Shelley published in 1818. In it, Victor Frankenstein is a human who creates a monster (who is never named). In popular culture, however, "Frankenstein" is taken to be the name of the monster, not its creator. The novel is later mentioned in 2604: Frankenstein Captcha and 2799: Frankenstein Claim Permutations.

While this is an often-corrected "error", it has been argued that it is not technically incorrect to call the monster "Frankenstein" as well, since he is the "offspring" of his "father", Victor Frankenstein. Since a child usually takes on the last name of their father, it may be said that the monster's last name actually is "Frankenstein". He also refers to himself in the novel as "the Adam of your labors" - a reference to the Biblical Adam, the first of his kind - and some have taken to calling the monster "Adam Frankenstein" to differentiate him from the scientist, Victor Frankenstein.

Others have argued that the monster's namelessness is an important part of his characterization in the story since it reflects the doctor's complete rejection of his creation. While the monster identifies Victor as his "father" in the novel, Victor does not consider the creature to be his "son".

Not helping matters is the equally-famous Frankenstein

film series staring Boris Karloff, featuring a very different plotline and a very different portrayal of the monster. Within the movies themselves the monster once again goes unnamed, but the movie titles and posters refer to the monster simply as "Frankenstein." For example the 1935 film Bride of Frankenstein is a double-meaning, featuring brides for both the human Henry Frankenstein and the monster, thus implying the monster can be called "Frankenstein."

Randall apparently finds this argument tedious and pedantic, so he has created his own work of fiction, in which the monster is named Frankenstein. He rationalizes that it is now correct to call the monster Frankenstein, assuming that his comic strip is as authoritative as the original novel. "Canonical" (rule, standard) means that this comic should be used as the authoritative work on the naming of the monster.

However, xkcd's Frankenstein would be unlikely to be accepted by anyone as canonical, except for its stated purpose of settling the naming argument. The original version of any story is usually assumed to be the canonical one, and any derivative work would have to have widespread influence and recognition to supplant it in the popular imagination. This is not likely to happen with xkcd's Frankenstein, as it makes almost no effort to stand on its own; it exists only to be a version of Frankenstein where the monster is named "Frankenstein." It emphasizes this point several times, and ends within a single panel, having accomplished its only goal. Almost no readers would find this version

entertaining or substantive enough to displace Mary Shelley's original as the definitive version of the story.

The copyright on Mary Shelley's novel has expired long ago, before the moon landings (which began in 1969), so it is perfectly legal to create works derived from the original story. It should be noted, however, that Universal holds the copyright on the common image of the monster (green skin, flat-top head, scar, bolts on the neck and protruding forehead). To qualify as a derivative work the story needs to be substantially different from the original. The monster believing in moon landing conspiracy theories would probably qualify, but may reference retellings of the tale where a damaged or deranged brain was used (as an alternate 'explanation' why the supposedly perfect creation inevitably runs amok). Additionally, the original Frankenstein's monster was seen by its creator as hideous and repulsive due to its physical appearance despite the project being a success. Randall makes the same correlation in his version by having Frankenstein claim the moon landings were faked, which produces the same feelings in The Doctor.

Alternatively, the monster being a moon landing denier is meant as a throwaway absurdist non sequitur. As the only point of this story is to make a canonical version of Frankenstein where "Frankenstein" is the monster's name, it should logically end once it has finished making that point clear. However, Randall throws a curveball by having the monster blurt out an uncomfortable and controversial point of view before the ending, then ending the story abruptly before the monster's

statements can be addressed.

It is also possible that Randall is making reference to the fact that the kind of people who become engrossed in the debate that is attempted to be resolved in this comic and would bother to create a piece like this (which incidentally, complicates matters further rather than simplifying it, similar to the effect of many pieces of evidence in internet discussions) could be compared to the kind of people who deny the Moon Landings in obscure forums. He is drawing attention to how inane and unnecessary the comic is.

The title text raises the question of what the monster's creator is named in this version, since the name "Frankenstein" is instead given to the monster. The canonical answer is that the creator is simply "The Doctor", like the title character of the series "Doctor Who". This might be a reference to similar pedantic nitpicking that occurs when that character is incorrectly referred to as "Doctor Who" rather than "The Doctor" which is in turn referenced in comic 1221: Nomenclature. As it happens, people who make that mistake can also claim canonical support, in that some early episodes of the series list the character's name as "Doctor Who" in the credits, or reference the recharacterization in the cinematic retellings.

#1590: The Source

October 14, 2015
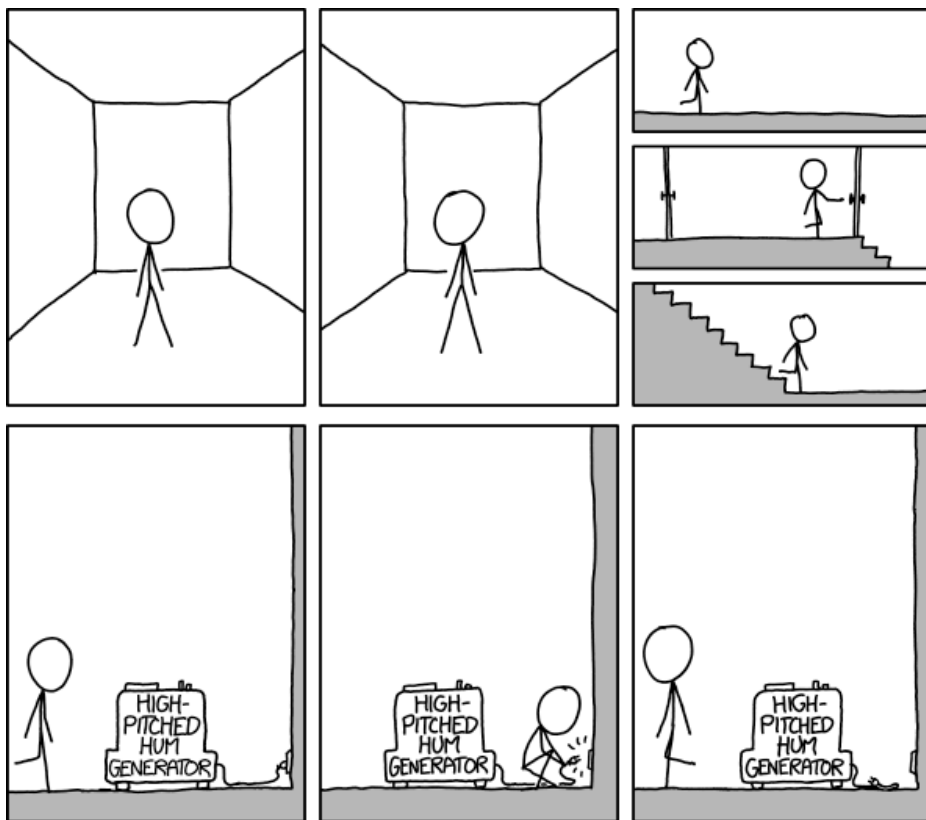
Why did we even have that thing?

Explanation

This comic is about experiencing a high pitched hum in an empty room. An "empty-room hum" is a high pitched buzzing noise, often caused by tinnitus, which is a medical condition causing high-pitched noise when there is no other noise around. Tinnitus is normally a hearing condition, not a disease. It may result from the brain increasing its sensitivity to noises.

Sometimes not everyone can hear "empty-room hum"; however, those who can hear it usually find it immensely annoying. If you do hear the noise, you would like to locate The Source – hence the title of the comic. Hopefully when you find the source, you can do something about it. Or if you don't find it, you can at least be at ease knowing that others experience the empty-room hum, it having been referenced in two xkcd comics now and elsewhere on the internet.

This comic alludes to the perspective of an outside observer who doesn't hear the hum but is watching someone who can hear it: because the sound isn't written out in text, the comic reader at first is confused by Cueball's inexplicable searching.

In the first two frames of the comic we see Cueball trying to locate the direction of the sound, by standing in the middle of the room, turning his head from one to the other side. Finally he walks down a flight of stairs (probably to the basement) and here he locates the

source: A machine whose only function is to generate a high pitched hum. The title text asks why they had such a machine in the first place, which is somewhat difficult to explain and likely the crux of the title text's joke.

Luckily it was thus easy for Cueball to get rid of this sound at the source. But in real life most electronics generate hums and cannot reasonably be turned off without losing functionality. For instance fluorescent lights, phone chargers and computer modems are common culprits, refrigerators and washing machines less commonly. It could also come from outside the house, in which case it will be much harder either to locate the source or to do anything about it. Power lines and transformers are common outside sources.

There do, however, exist devices that are meant to create a high pitched hum, that people might wish to install in their house. These will be humming in the ultrasonic regions, although cheap versions can often be heard by young people. They are typically used for electronic pest control, while slightly lower frequencies which can typically be heard only by young people are sometimes used to repel children. It is possible that someone tried to get rid of Cueball.

There do exist white noise generators (which make equal volume noise on every frequency) and pink noise generators (which make noise that has an equal amount of energy at every frequency) which are used to test recording studios to see if they have good sound quality. It seems unlikely that the device is one of these, as it

seems to be designed to generate a high-pitched hum: pink/white noises are categorically and perceptually different from a hum.

The sound wave spectrum in 273: Electromagnetic Spectrum also contains a line for "that high-pitched noise in empty rooms".

The empty white room also could be a reference to a scene from The Matrix Reloaded in which Neo searches for "The Source," though this is likely just a coincidence.

There is a story by A.E. Van Vogt in "The War Against the Rull" where an all-pervasive vibration leads to a coming of age for the youthful protagonist.

Identifying sounds in empty rooms was previously mentioned in 1199: Silence.

The high-pitched hum generator would later be referenced in 2848: Breaker Box.

#1591: Bell's Theorem

October 16, 2015
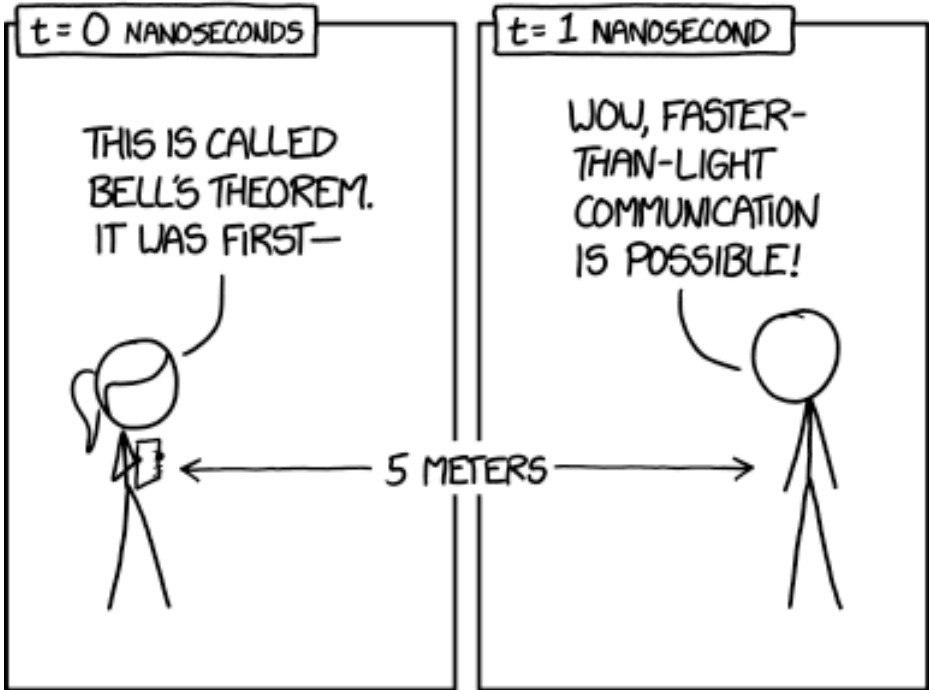
BELL'S SECOND THEOREM:
MISUNDERSTANDINGS OF BELL'S THEOREM
HAPPEN SO FAST THAT THEY VIOLATE LOCALITY.

The no-communication theorem states that no communication about the no-communication theorem can clear up the misunderstanding quickly enough to allow faster-than-light signaling.

Explanation

Ponytail begins reading Bell's theorem to Cueball, who is standing 5 meters away. Bell's theorem, invented by the physicist John Stewart Bell, suggests that local hidden variables - that is, unknown properties of a system that are communicated via physical effects within the system's nearby surroundings - are not sufficient to fully explain quantum mechanics. This means that any complete description of quantum mechanics must necessarily include some non-local effect - some kind of influence that can be transmitted from some remote location not within the system's reach. Furthermore, that influence must necessarily travel instantaneously and does not obey the limit of the speed of light.

Cueball responds by misunderstanding this to mean that faster-than-light communication is actually possible. However, his misunderstanding occurs in 1 nanosecond. Since the speed of light in a vacuum is 299,792,458 meters per second, the light from Ponytail would have traveled only 30 centimeters, which means that Cueball has managed to misunderstand Bell's theorem faster than the speed of light - a feat that violates locality, just as the theorem predicts.

The punchline is that this is a special case known as Bell's Second Theorem: the idea that misunderstandings about what Bell's theorem means happen so readily that they actually violate the principle of locality.

This comic was published on October 16, 2015, five days before an article about the first-ever Loophole-free Bell's Theorem test was published in Nature magazine (DOI:10.1038/nature15759) (see also Bell test experiments). However, the paper was submitted almost two months earlier on the 24th of August and could most likely be found online before this comic was released. It was accepted by Nature already on the 28th of September, but was first published online October 21, 2015. Randall may very well have been aware of the imminent release of this paper, although it is peculiar that he did not wait until the paper was released. (This could potentially be a meta-joke, with the joke about Bell's Theorem being released before the paper about the relevant experiment was published)

Another way to state Bell's theorem is "No physical theory of (finitely many) local hidden variables can ever reproduce all of the predictions of quantum mechanics." It says that a theoretical treatment that divides the universe up into separate ("local") systems like this will always discard something about those systems' intercorrelations.

It is possible that there could be "global hidden variables" which share information across systems, perhaps by some manner of superluminal communication - however, this has unsettling philosophical implications such as superdeterminism, where the universe is essentially just reading off a script and no free will is possible. Needless to say, many people find this an unsatisfying resolution.

The preferred resolution of the paradox is not to insist (as early physicists did) that the universe's state is a collection of bits (classical information), but treat it as a collection of qubits (quantum information).

In quantum mechanics (QM), "measurement" is the process of allowing a small system to interact with its environment in a controlled way. The interaction allows information about the system's state to escape to the environment, producing an "observation." If the measurement apparatus is governed by classical mechanics (impossible in reality, but a very common simplification for the purposes of calculation), then the observation can be thought of as classical information, a bit (yes/no answer) in the simplest case. While the system may have been in any one of infinitely many states before the measurement (each a superposition of classical states), the fact that the measurement must leave it consistent with the classical result means that it can end up in only finitely many states afterwards. This is the "wave-function collapse" of early QM, popularized by Schrödinger's cat, but unrelated to the Heisenberg Uncertainty Principle, with which lay audiences often confuse it.

Modern quantum mechanics acknowledges that the environment is not classical, and that wave-function collapse happens by a (comparatively) gradual process called "decoherence," where information leaving the system is made up for by information coming from the environment that drives the system closer and closer to one of the finitely many states predicted by the simplified

model above. If a "Schrödinger's cat" is in a half-and-half superposition of the states "dead" and "alive", when its liveness is measured, the ratios of "dead" and "alive" will shift rapidly towards (though not quite reach) 0 and 100% or 100 and 0%. For all but the shortest time scales, the cat's post-measurement state might as well be classical.

Entanglement is a situation where the future outcomes of two or more measurements that would be independent in a classical world are nonetheless correlated. For example, two widely separated electrons from one source could be in a state where, considered individually, each is in a superimposed spin-up/spin-down state, but if one is measured as spin-up, the other will necessarily be measured as spin-down. This is untroubling if the two electrons are modeled as a single system, but strange-seeming if we think of them as separate: how did the measurement of the first electron allow information from the environment around it affect the far-away second electron? It seems like the electrons are communicating, potentially at superluminal speeds, which would violate either relativity or causality. In actuality, there's a fairly simple proof (see below) that correlations from entanglement can't be used to communicate, and causality and relativity are safe. But that doesn't make the seemingly faster-than-light effects much less of a surprise.

One can try to address these concerns by considering 'local hidden variables', classical properties of a local system (like a single electron) that could have been

observed but were not. For example, perhaps a classical part of the electrons' state lets them "agree" on a future classical state at the moment they are entangled, and then they just reveal that state in the future. But this becomes unwieldy: there are infinitely many possible future observations the electrons would have to agree on, and it seems difficult to do this without infinitely many local hidden variables.

The title text jokes about the No-Communication Theorem. The real theorem states that although determination of the state of one half of an entangled pair immediately determines that of the other half, however far away it may be, there's no way for the observer of the other half to see if he's the first to find out the state or whether it'd already been determined by the first observer. Thus, no information travels from one observer to the other.

Randall's version of the No-Communication Theorem states that no matter how you try to send information about this theorem (no communication about the No-Communication Theorem) then it cannot clear up the misunderstanding about Bell's Theorem quickly enough that any correct information (about Bell's theorem) has actually been transferred faster than light. So the conclusion is the same as the real No-Communication Theorem - faster-than-light signaling is not possible...

#1592: Overthinking

October 19, 2015
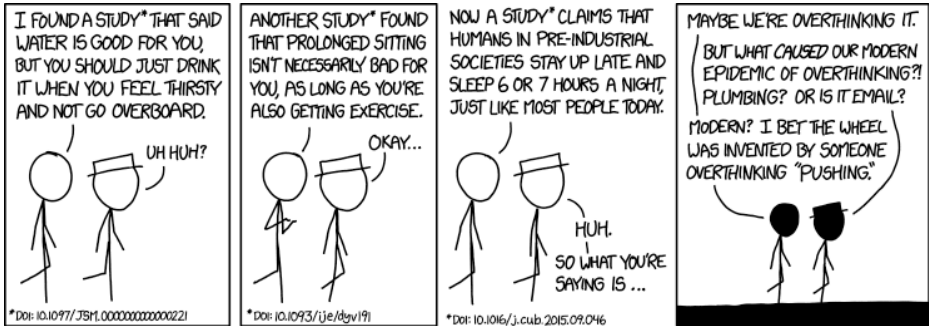
On the other hand, it took us embarrassingly long to clue in to the lung cancer/cigarette thing, so I guess the real lesson is "figuring out which ideas are true is hard."

Explanation

In this comic, Cueball is telling White Hat about several recent scientific studies he read that appear to contradict the results of either prior studies whose results have stood for a long time or are long-held misconceptions. The studies can be reviewed on-line via their Digital Object Identifier (DOI) in Randall's citations.

In the first, Cueball mentions a study that showed that while water is good for you, you only need to drink when you are thirsty. This appears to be a reference to common misconceptions that we should drink a certain set quantity of water per day (oft-cited as eight cups - see 715: Numbers, 1853: Once Per Day and 1708: Dehydration) and may even be referencing the fact that drinking too much water (well more than the standard 8 cups, for most people) can lead to hyponatremia (lack of salt in the body).

Another recent study showed that prolonged sitting is not bad for you which contradicts the long-held belief that sitting at a desk all day is unhealthy and that standing or lying down are healthier. The study showed that the position is not particularly relevant if there is no physical activity in any of the positions.

Finally, Cueball references a study that pre-industrial humans have similar sleep patterns to our own, which would appear to contradict a belief that modern technology has disrupted our sleep patterns (which is

likely tied to health concerns around our modern sleep habits).

Cueball's conclusion is that humanity may be over-thinking things in trying to find problems in the way we live our everyday lives. In the last panel, White Hat seems to be attempting to start an inquiry into what everyday modern phenomenon has caused us to over-think things. This is obviously a self-referencing example of the types of claims Cueball is debunking in the first three panels. Cueball responds by suggesting that humanity's over-thinking is likely not a recent phenomenon but probably dates back to the stone age. This could also be viewed as an argument that over-thinking is not all bad, as the wheel would certainly be a good result of over-thinking.

In the title text, Cueball gives a counter-example to his own argument, suggesting that it took far longer for us to realize the negative health connotations of smoking than it should have. Suggesting instead it's not about overthinking or underthinking-it's just that people make mistakes about what is important. (The link between cigarettes and lung cancer has been known for longer than most people realize, possibly coming as early as the 1940s.)

Links to studies referenced[edit]

- Panel 1: DOI:10.1097/JSM.0000000000000221: "Statement of the Third International Exercise-Associated Hyponatremia Consensus Development Conference, Carlsbad, California,

2015″, Clinical Journal of Sport Medicine, July 2015, Retrieved 19-Oct-2015

- Panel 2: DOI:10.1093/ije/dyv191: ″Associations of sitting behaviours with all-cause mortality over a 16-year follow-up: the Whitehall II study″, International Journal of Epidemiology, 27-Aug-2015, Retrieved 19-Oct-2015

- Panel 3: DOI:10.1016/j.cub.2015.09.046: ″Natural Sleep and Its Seasonal Variations in Three Pre-industrial Societies″, Current Biology, 15-Oct-2015, Retrieved 19-Oct-2015

#1593: Play-By-Play

October 21, 2015

Panel 1: FOR THOSE JUST JOINING US, HI! WE'RE ON PART 5 OF A HITTING GAME.

Panel 2: THE NEXT GUY HAS A BIG BAT, SO HE'LL PROBABLY HIT THE BALL REAL FAR.

WAIT—HE MISSED!

OH GOOD, THEY'RE LETTING HIM TRY AGAIN.

Panel 3: THE PEOPLE SITTING ON THE CHAIR SHELVES ARE YELLING AT THIS GUY BUT HE'S IGNORING THEM. WOW.

RUDE.

Panel 4: THIS THROWER IS GOOD! HE KEEPS MAKING PEOPLE LEAVE BY THROWING BALLS AT THEM.

IT'S JUST HIM, THOUGH. NONE OF HIS TEAMMATES ARE JOINING IN.

Panel 5: THAT GUY JUST RAN TO THE SECOND PILLOW WHEN NO ONE WAS LOOKING!!

EVERYONE'S REAL MAD BUT I GUESS THEY CHECKED THE RULES AND THERE'S NOTHING THAT SAYS HE CAN'T DO THAT.

YIKES. HOPEFULLY THEY CAN FIX THAT ONCE THIS GAME IS OVER.

The thrower started hitting the bats too much, so the king of the game told him to leave and brought out another thrower from thrower jail.

Explanation

Beret Guy comments on a baseball game using improper terminology in a way that demonstrates that he does not understand how the game is played. Moreover, his naïve way of speaking reveals that he is not aware of his lack of knowledge and does not consider it possible that, as is probably the case, his audience is much more familiar with this sport and its rules. His unworldly way of talking makes one even wonder if he has any notion of the way people experience sports at all. His choice of terminology is reminiscent of 1133: Up Goer Five, and 1322: Winter in that he names things using simplified terms that he feels best describes their function like "thrower", "second pillow" or "thrower jail". His commentary is a combination of mistaken terms and misunderstandings of the rules and principles of the game.

#1594: Human Subjects

October 23, 2015
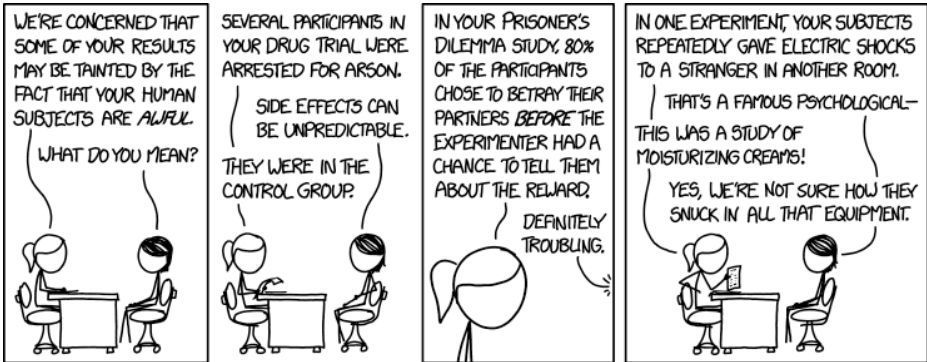
After meeting with a few of the subjects, the IRB actually recommended that you stop stressing out so much about safety guidelines.

Explanation

This strip plays on certain experiments involving human subjects. Ponytail is questioning the reliability of Megan's experimental results, given that her human subjects appear to be extremely unusual and surprisingly evil.

In the second panel, she mentions that several people in one study had been arrested for arson. Megan begins to suggest that the arson is a side effect of whatever is being tested before she learns that the arsonists are in the control group – that is, the group that is not subjected to any kind of treatment. This suggests that Megan's selection process is heavily biased toward arsonists, for some reason.

The third panel alludes to the prisoner's dilemma, which is a long study example of game theory in which two participants are forced to choose between protecting and betraying the other. Each will be rewarded for betraying the other, but the best outcome for both is achieved if neither of them does. This is often used as an example of a situation where each party narrowly pursuing their self-interest will lead to a sub-optimal outcome. Megan's subjects, however, overwhelmingly choose to betray their partners, before being told of any reward. This suggests that betraying their partners is a goal they'll seek for its own sake.

The last panel references the Milgram experiment, which was designed to test compliance with authority. In the

experiment, subjects were instructed by experimenters to administer electric shocks to a third party. While the shocks were fake, the subjects didn't know this, and the victims were instructed to feign pain and beg for it to stop. The experimenters insisted that the subjects continue administering shocks, and many subjects did so, despite their misgivings, simply because they were ordered to.

Ponytail appears to be describing a similar experiment, until she reveals that the actual study had nothing to do with the shocks, and the subjects apparently smuggled in equipment, with the express purpose of administering real electric shocks to (presumably unwilling) people in another room.

In each of these cases, the subjects seem to have some some very troubling personal and psychological traits. While a given study might include one or two people with such traits, just by chance, it appears that all, or nearly all, of the subjects in Megan's study possess a disturbing level of malice, and a lack of both empathy and fear of consequences.

The title text refers to safety procedures normally required by institutional review boards, which are centralized groups within universities that ensure that experiments are ethical and safe. The implication is that the IRB, despite their professional and ethical commitment to safe studies, are so appalled by the people in this study that they're no longer concerned with their safety, or that safety measures are irrelevant at this point

because they'll be broken anyways.

#1595: 30 Days Hath September

October 26, 2015

THIRTY DAYS HATH SEPTEMBER,
APRIL, JUNE, AND NOVEMBER
ALL THE REST HAVE 31—
EXCEPT FEBRUARY, WHICH HAS 28,
AND LEAP YEAR MAKES IT 29.

WAIT, WHICH MONTH WAS I LISTENING
FOR? OH RIGHT, OCTOBER.

DID I SAY "OCTOBER" IN THERE?
NOW I CAN'T REMEMBER.

30 DAYS HATH SEPTEMBER...

I GET STUCK IN THIS LOOP EVERY MONTH.

There's a cool mental calculation hack I recently learned for this: If you open the calendar app on your phone or computer, the highest-numbered box along the bottom is equal to the number of days in the month!

Explanation

Thirty days hath September is a mnemonic frequently used to remember how many days each month has in the Gregorian calendar. Cueball is reciting the mnemonic trying to figure out how many days October has. This comic was released during the last week of October (the 26th) where it becomes increasingly relevant to know if there are 30 or 31 days in the month. However, he seems unable to concentrate on reciting the poem correctly, keeping track of which months the poem has named and keeping in mind the specific month he was interested in, so by the time he finishes the poem he is unsure whether October was in the list of 30-day months or not. So he starts over again with the same result every single time, as can be seen from the caption below the frame. It seems he also get stuck in all the other months disregarding if it is one of the month mentioned in the mnemonic.

There are numerous versions of the mnemonic, some of which rhyme better, but this version is one of the more common ones. The knuckle mnemonic is an unrelated alternative.

In the caption, Randall states that this happens to him every month. It's assumed that, after a number of iterations with the poem, he eventually remembers the months correctly and figures out the number of days in the current month, which he then remembers until the month changes and forces him to resort to the mnemonic again.

The title text is a parody of life hacking, and suggests just looking up on one's computer's calendar how many days there are in each month, with the punchline disguised by over-explaining the process of the "cool mental calculation hack" (even though there's nothing even remotely resembling a mental calculation in checking a calendar). Alongside the comic, the joke is that the mnemonic is supposed to be the real "cool mental calculation hack" which supposedly saves a lot of effort. This is similar to 1567: Kitchen Tips.

It may also be considered amusing that Cueball is unsure whether there are 31 days in October, seeing as Halloween is a largely celebrated holiday on the 31st.

#1596: Launch Status Check

October 28, 2015
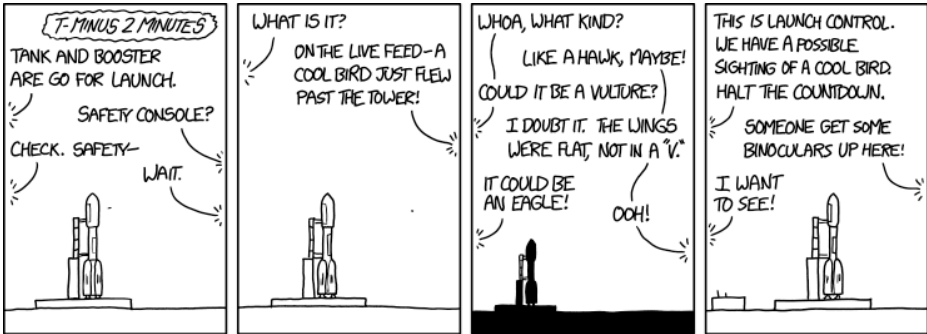
Visual checks suggest the cool bird has exited the launch zone. Tip the rocket sideways and resume the countdown--we're gonna go find it!

Explanation

The first panel shows a rocket launch, which is a critical point in any space mission. Before this moment, a large technical staff has put in years of hard work, but all that work (and even lives) could be destroyed in a second if anything goes wrong during the launch. T-Minus 2 minutes means that there are only two minutes left before the rocket is actually launched, so at this moment everybody is very nervous and worried about the launch going wrong. Other texts from the panel refer to the usual checks before the launch, whose end is to ensure everything is ready.

In the second panel, one of the people controlling the launch sees a "cool bird" on the live feed from the cameras controlling the operation. This should be of no importance at all, given the relatively much more serious matter of having years of work and possibly human lives at stake. However, the technical staff starts commenting on this cool bird and aborts the launch procedure as they are interested in the bird. This behavior would be absurd in real life,[citation needed] but may be presented as a comically extreme example of nerd sniping.

In the third panel, the two controllers attempt to identify the bird; the one on the right guesses maybe it is a hawk. Since the habitat of hawks and vultures overlap almost entirely, a birdwatcher is almost certain to accidentally confuse the two in their lifetime of birdwatching. Obviously having this knowledge of the habitat overlap,

the controller on the left asks if the bird was a vulture. The controller on the right accurately notes that it probably was not a vulture since it is commonly known to ornithologists that vultures "hold their wings slightly raised in a "V" when seen head on.". However, this demands that the original sighting of the bird must have included a flight pattern in which the bird not only "flew past the tower" as stated, but also flew towards the tower... even cooler!

The title text goes on with the same absurd behavior: the crew restarts the countdown to launch the rocket, but only to follow the bird and get a closer look at it. The original space mission the rocket was designed for is completely ignored. This is even more absurd than the initial interest in the bird, given that a rocket designed to enter outer space is ill equipped to try to follow a bird and maneuver at the low elevation and at the relatively slow speed of a bird.

This could also be a joke in the well known fanaticism of serious bird watchers, who think nothing of spur of the moment day long road trips (or flights!) in order to get to view an unusual bird.

The vehicle pictured is not clearly identified, and it could also be totally fictional. It could be the Atlas V or the Ariane 4 launch vehicle. It also shows some similarity with the SpaceX Falcon 9 Heavy launch vehicle (albeit with stubbier strap-on boosters), named after the Falcon, another bird of prey. This would increase the absurdity of the situation.

The bird being referred to by the launch-crew features as a mere mark on the comic-strip, consistent with scale against the rocket, but they are obviously trying to start to identify the rough species or group it belongs to from the wing geometry, the effortlessly soaring carrion-seeking vulture and the hawk that often uses a swooping attack upon its prey typically having very different wing configurations as matches their evolved lifestyle.

#1597: Git

October 30, 2015

If that doesn't fix it, git.txt contains the phone number of a friend of mine who understands git. Just wait through a few minutes of 'It's really pretty simple, just think of branches as...' and eventually you'll learn the commands

that will fix everything.

Explanation

This is Git[edit]

Git is a version control system, used to manage the code in many millions of software projects. It is very powerful, and was amongst the first widely adopted tools to use a distributed version control model (the "beautiful graph theory tree model"), meaning that there is no single central repository of code. Instead, users share code back and forth to synchronise their repositories, and it is up to each project to define processes and procedures for managing the flow of changes into a stable software product.

How do we use it?[edit]

Although very powerful, the command line of Git is notoriously difficult to master. Dozens of blog posts and websites (see ,), and even books (,) have been written to help users navigate this complexity.

The difficulty of using Git in common situations is contradicted by the apparent simplicity of its use in tutorial-style situations. Committing and sharing changes is fairly straightforward, for instance, but recovering from situations such as accidental commits, pushes or bad merges is difficult without a solid understanding of the rather large and complex conceptual model. For instance, three of the top five highest voted questions on Stack Overflow are questions about how to carry out relatively simple tasks: undoing the last commit, changing the last commit message, and deleting a remote branch.

This comic thus explores the difference between the idealised

view of Git's architecture, and its actual typical usage. Tutorials for Git tend to use simple systems in their examples, and only deal with the most basic commands to get started, which can create the misleading impression that Git can be used effectively without extensive study.

Due to this problem, compounded by the fact that Git's commands are named differently from similar commands in other version control systems, many users (including Cueball) are unable to use it beyond basic commands, and might try to avoid problems by saving their code outside Git, downloading a newer copy, and then re-applying their changes to the new copy instead of trying to understand and use the features that exist in Git to accomplish this task.

Memorize these shell commands[edit]

Cueball suggests "just memoriz[ing] these shell commands and type them to sync up". He is probably referring to a sequence of commands such as:

If you get errors...[edit]

As long as every contributor to the project follows these principles, this may suffice for a while. But many situations may cause "errors":

- merge conflicts (two people editing the same part of the same file)
- unmerged changes (another person committed a change before you did, so you need to merge their changes first)
- attempting to recover from a situation such as an accidental merge, and making the situation worse.

In a situation such as a merge conflict, Git will show an error message such as:

Save your work elsewhere...[edit]

Although Git experts can of course deal with such situations, the remedy proposed by Cueball is "save your work elsewhere, delete the project, and download a fresh copy". That is, to copy the files out of their local repository's working directory, delete that whole structure, then clone the remote repository again (and, implicitly, copy the saved work back again):

Abandoning the old project likely means losing some work, but may be faster and give a more predictable outcome than attempting to salvage the situation. Applying this method to a mere merge conflict issue may prolong the issue however, as the merge conflicts may still be present.

Title text[edit]

The title text suggests an alternative method for working around Git's complexities, which reflects common practice: knowing a "Git expert" who can help in any situation. Such experts are somewhat notorious for waxing lyrically about Git's strengths, so it may be necessary to win their favour by first letting them ramble enthusiastically about it. They will hopefully eventually give the exact commands needed. In practice, the question-and-answer site Stack Overflow is frequently used for this exact purpose.

It may even be a reference to the infamous tweet "Git gets easier once you get the basic idea that branches are homeomorphic endofunctors mapping submanifolds of a Hilbert space" which

has been discussed here but it is inconclusive whether a meaningful interpretation exists.

Putting a telephone number of someone who "understands Git" into such a file is humorous because:

- Software teams would more normally use electronic means of communication

- Explaining Git over the phone to team members should not be necessary, as there is extensive help available online, and

- In the situation where many team members would need phone support to avoid or fix basic Git problems, this would be extremely distracting to the person whose phone number was given in the file.

TL;DR[edit]

In short: programmers use version control systems to track changes to code. Most of these version control systems are quite similar and easy to learn if you already know another one. Git is a version control system based on completely different principles, and most programmers find it difficult to wrap their heads around it (although Git also offers a large number of nontrivial benefits over standard version control systems, which is why it is used). Cueball is one of those programmers.

#1598: Salvage

November 02, 2015
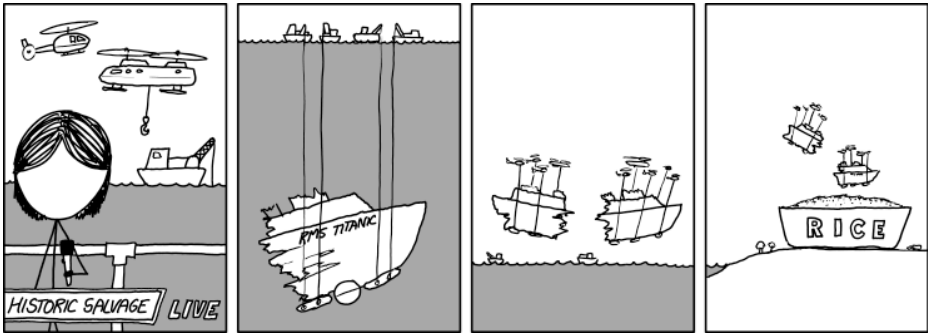
My hobby: Taking advantage of the rice myth by posting articles on "how to save your wet phone" which are actually just elaborate recipes for rice pilaf.

Explanation

The RMS Titanic was a large ocean liner which, when it was completed in 1912, was the largest ship afloat. The ship famously hit an iceberg on its maiden voyage and sank, killing two-thirds of its complement (approximately 1,500 people out of the estimated 2,224 people aboard) in one of the deadliest peacetime maritime disasters ever.

As it sank, the Titanic broke into two pieces. The ship was lost for decades until the wreck site was discovered in 1985. A number of proposals have been made to salvage the wreck of the Titanic both before and since the wreck's discovery, famously fictionalized in the thriller novel and film Raise the Titanic! There could be a joke on this title as in Rice the Titanic, even though it would not be possible to mistake the two words when spoken in the majority of dialects of English.

The general consensus at this time is that the wreck is too fragile to be salvaged intact. Numerous expeditions have been made to the wreck site since its discovery, with several parties (without any outside authorization) taking various artifacts from the site. A popular view is that the wreck is effectively a mass grave and that plundering the site for profitable artifacts is akin to grave-robbing. Most believe the wreck should be left where it is, intact. That said, explorers have already done notable damage to the wreck.

This comic shows a fictional attempt to salvage the two main pieces of the Titanic wreck, which, as it likely would in real life, garners media coverage as a 'historic salvage'. The salvage seems to consist of several ships raising the hull via cables attached to some sort of buoyant sled placed under the hull (as might actually happen, except that the relative sizes of the ships and the hull are wrong; this method would require the salvage ships be much larger in proportion to what is being salvaged). This is followed by helicopters carrying the hull in unison, again via cables to the cradle (a much less practical operation). The hull halves are then dropped into a giant tub of rice. The entire salvage attempt is increasingly cartoonish and unrealistic, but the tub of rice takes this to another level. Also, the two parts of the Titanic collapsed when hitting the sea floor, and thus could not be moved as shown in the comic. See this video of How Titanic Sank.

The punchline to the comic references the "rice myth," (as Randall calls it) a popularly disseminated method of salvaging consumer electronics (usually cell phones) which have been submerged in water. (See Research Shows Rice is the Answer for a Wet Mobile). The method entails burying the wet device in a bowl of rice. This process is commonly claimed to dry the device, but investigation reveals that the process is only mildly effective (though not entirely a myth either, see below). This comic likely plays on the dual meaning of the word "salvage" in respect of electronics and maritime wrecks.

The comic suggests that the wreck of the Titanic would

benefit from being dried as quickly as possible, in a humorous contrast to actual reality. Surviving non-metallic material on board the ship may not benefit at all from drying. Far more ancient shipwrecks are best preserved by keeping the recovered timbers wet (but progressively desalinated, where applicable), cool and anoxic, at least while conserving chemicals such as Polyethylene glycol are infused into the wood to allow safe and gradual drying without causing further damage. Leather, cloth and other organic remains may have variations on this regime. Thus the rice might benefit an electronic device briefly exposed to water, but is not likely to benefit a ship that has been immersed for over a century, where the interest is in more than merely stabilizing the remaining metal hull and infrastructure.

There are numerous on-line discussions of the technique with mixed levels of success. Critically, where rice is tested against other methods, rice appears to perform worse than other methods. Controlled experiments on this topic tend to show that silica gel (aka the "Do Not Eat" packets often found in boxes with electronics or pharmaceuticals) is the most effective drying agent, with mixed results for rice. (see Myth Debunked: Uncooked Rice Isn't the Best Way to Save Your Water-Damaged Phone, where it turns out that leaving the phone to air-dry may actually be the best solution).

The title text tells of another hobby of Randall's. He likes to take advantage of the "rice myth" to post fake articles on how to save your wet cell phone. But the instructions turn out to be elaborate recipes for rice pilaf. It is unclear

whether Randall's instructions would explain how to prepare the rice prior to inserting a phone (thus resulting a usable dish), or if the instructions would require the phone to be inserted into the dish before it became clear that the dish was a recipe for food and not a phone-saving measure, thus worsening the condition of the phone. This may also be a "punishment" by Randall to anyone who would follow instructions blindly before reading them through, as a recipe for rice Pilaf would likely be distinguishable from phone-saving instructions by someone who read the instructions through before attempting them. Or it may just be that Randall considers those who would follow instructions for saving a phone with rice that they find on the internet gullible enough to believe the seasonings and other ingredients would have a curative effect on electronics.

The victim would hopefully realize they are reading a pilaf recipe somewhere between "rinse the rice" and "add the rice to hot fat or oil." They may initially wonder how fried onions help their phone dry out. Presumably, they would not put their phone into boiling water alongside the rice.

The rice myth is revisited in one of the tips in 1820: Security Advice.

#1599: Water Delivery

November 04, 2015

NOW THAT AMAZON IS ADVERTISING ONE-HOUR DELIVERY OF BOTTLED WATER,
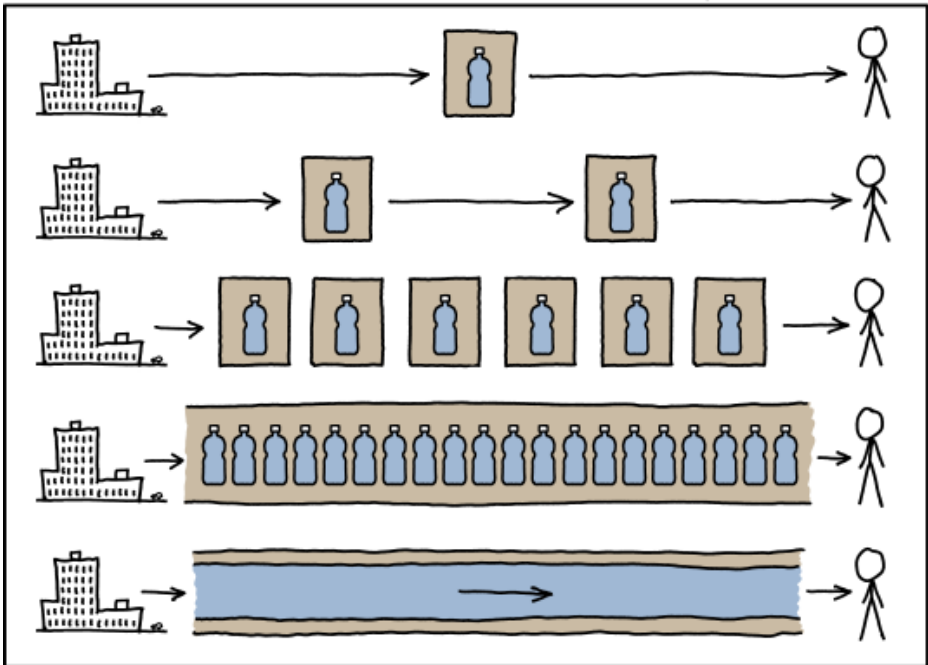
I VOTE WE START CALLING MUNICIPAL PLUMBING "ON-DEMAND HYPERLOOP-STYLE WATER DELIVERY" AND SEE IF WE CAN SELL ANYONE ON THE IDEA.

When I was a kid, I asked my parents why our houses didn't have toothpaste pipes in addition to water ones. I'm strangely pleased to see Amazon thinking the same way.

Explanation

Amazon has added bottled water to its line of on-line home order goods, which they are calling Prime Now. In served areas, which include Manhattan/Brooklyn, Baltimore, Atlanta, Miami, Dallas, Austin, Houston, Indianapolis, Chicago, Seattle, Portland, Los Angeles, Minneapolis, San Francisco, San Jose, San Antonio, Las Vegas, Sacramento, and Phoenix, many products – including but not limited to bottled water – are available to be delivered within one hour. So we are faced with the prospect of water, contained within plastic bottles, contained within cardboard shipping boxes.

As increasing amounts of water are ordered, on-demand, more frequently than the stated delivery time of one hour, this would show increasing numbers of packages sequentially passing from Amazon HQ (or its distribution hubs) to an arbitrary end-user as shown in the comic. Beyond a certain (already impractical) point, it might be better to merge the packaging together into a single longitudinal structure through which one could first deliver back-to-back bottles of water, as shown in the second-to-bottom illustration, and then (as the requested water quantity increases beyond that model) eventually just merge the containers themselves to 'pipe' the water within what can then become one single length-of-delivery packaging/container, as shown in the final illustration. (If kept stationary, only forcing the liquid within to move, this would also solve the problems of what happens with the layers of packaging at the

destination, or how to potentially return containers to the suppliers for re-use.)

While this could apply to one degree or another to any merchandise, for the purposes of the comic and for the reasons described next, water was chosen for this example – because that's really what existing water-mains do. And hence Randall's recommendation or vote that we start calling the regular municipal plumbing "on-demand hyperloop-style water delivery". In order to promote any 'new' technology, various buzz-words are used, and here it is hyperloop, reminiscent of Elon Musk's 'piped transportation system', which (from the outside, at least) appears to be taking discrete passenger units (trains, cars, buses and planes) and replacing them with a stationary pipe within which the passengers 'flow.' (Albeit, in this case, still within discrete internal vehicles, not entirely like Futurama's 'piped people', which might be a bit messier). The closest real life application of this concept is that of subways (the "tube") to replace individual people (the "product") in cars (the "packaging"). Randall suggests trying to get someone to buy into this idea, only to later realize that they have just bought the idea of tap water. It is important to note that, in all places where tap water is available, it is not necessarily safely drinkable. Water filters at the destination can solve some of these problems.

The comic also seems to jab at the unnecessary buying of bottled water, when most places in the western world have perfectly drinkable water in the pipes. However, not all recipients like mains water (hardness, softness and

various additional water-treatment chemicals can affect taste and the action of water with detergents, and in some cities it might even be unwise to drink tap water, at least for tourists), which is why there is still a healthy business for bottled water (of many brands with subtleties to taste) even in households and establishments with piped-water available. The other explanation, for cynics only, is that the marketing budget for bottled water creates the industry. See The Gruen Transfer episode on Bottled Water (season 2 episode 3 (#13)) where the marketing is considered.

In the title text Randall tells that when he was a kid he was asking his parents why there were not an additional pipe for toothpaste next to the water pipe. Amazon thinking the "same way" is a sarcastic jab implying Amazon saw toothpaste tubes and wondered why water wasn't delivered the same way (in small bottles). Both are implied to be examples of childish ideas, but Amazon is actually following through on theirs. The idea of a toothpaste pipe is revisited in 1649: Pipelines.

#1600: MarketWatch

November 06, 2015
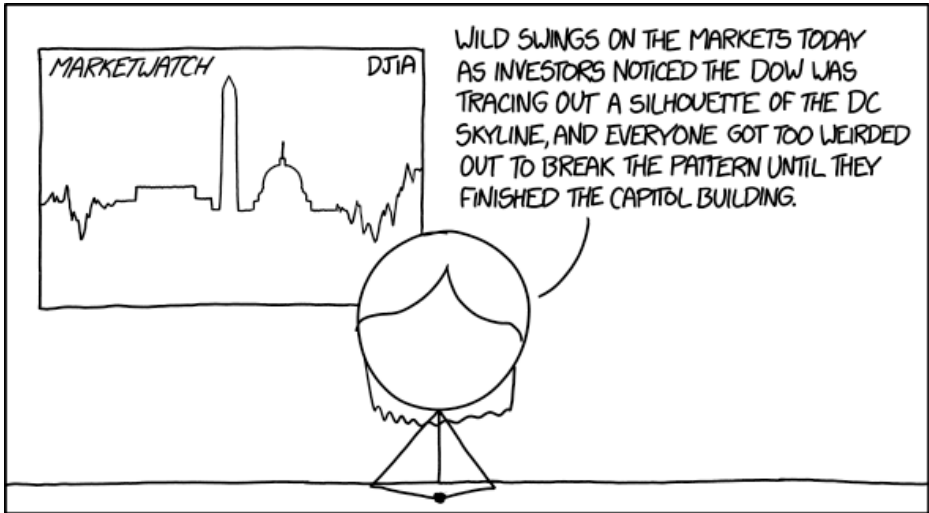
Markets have been rocked by a second day of uncertainty after someone set up a giant Ouija board on the NYSE wall controlled collectively by the movement of the stock tickers.

Explanation

Blondie as a news anchor is reporting on the day's price swings on the stock market. It has been noticed that the Dow index has traced out the DC skyline.

MarketWatch (as written above the skyline) is a website focused on stocks. The DJIA (as written on the screen) is the Dow Jones Industrial Average, commonly referred to as the Dow. It is a stock market index, meaning that it is a general indicator of how the market is running (in this case, an aggregate of how 30 major industrial companies are doing). The stock market is famous for having unpredictable price swings, but for them to specifically make a tracing of a skyline (or any recognizable image) would definitely weird out most investors. The DJIA has been featured previously in 426: Geohashing.

DC refers to Washington, D.C. The DC skyline shown here traces out the Lincoln Memorial, the Washington Monument (an obelisk) and the United States Capitol, which are located in that order in a line down the National Mall. This, this, this and some of these photos show the skyline depicted in the comic.

As seen in 276: Fixed Width, unusual patterns can be addictive to the point of harming those involved in the pattern's creation. The joke, however, rests in the fact that stock investors probably have a lot at stake, so following a pattern rather than pursuing gains would be uncharacteristic. Although some investors follow

superstitious behavior (such as making trades to follow a pattern rather than make more obvious profits), many trades are now made by automated computer systems, which may recognize some types of patterns, but would not recognize the DC skyline, making it impossible for the stock market to continue to follow such a pattern merely because of the efforts of the human traders.

Buying and selling stocks based on patterns in the price charts is a common, but controversial, method of investing. Many day traders and some professional investors still use stock patterns (head and shoulders, trend lines, etc.) to make trades (see for instance Analyzing Chart Patterns). Most professional investors and finance academics believe that this practice is random (see strong and weak efficient markets hypothesis).

In the title text it is noted that the markets again have been shaken by uncertainty (for the second day running, after the DC skyline incidence from the main comic). This time, it was because someone at NYSE (the New York Stock Exchange) had set up a giant ouija board that was controlled by the movement of the stock tickers, thus, collectively, everyone at the NYSE, as all have some influence on those.

The ouija is also known as a spirit board, a flat board marked with the letters of the alphabet, the numbers 0–9, the words "yes", "no" and possibly a few others. A movable indicator indicates a spirit's message by spelling it out on the board during a séance.

Ticker tape was an early way of transmitting stock price, and it was run through a stock ticker which printed abbreviated company names as alphabetic symbols followed by numeric stock transaction price and volume information. Today this has been replaced with electronics, but the concept of the stock ticker lives on in the scrolling electronic tickers seen on brokerage walls and on financial television networks.

If the stock exchange begins to look to spirit boards people will get worried (also maybe by the cryptic messages from beyond they are receiving via the stock ticker) explaining the uncertainty. Of course, some people might claim that this is not so far from how stock brokers decide what to do anyway...

#1601: Isolation

November 09, 2015

1840
THE MODERN BOOKWORM IS TOO BUSY *READING* ABOUT THE WORLD TO *LOOK* AT IT.

1880
NO ONE *TALKS* ANYMORE—WE TAKE OUR DAILY NEWSPAPERS IN SILENCE.

1910
THE MAGAZINE IS DESTROYING CONVERSATION. WE EVEN READ AS WE WALK!

1960
TELEVISION HAS PUT AN END TO FAMILY DISCUSSION.

1980
THANKS TO THE SONY WALKMAN, ANTI-SOCIAL ISOLATION IS NOW THE NORM.

2015
WE'VE BECOME TOO ABSORBED IN OUR PHONES TO NOTICE THE—

DUDE. IT'S BEEN *TWO CENTURIES.* TAKE A HINT.

2060: The gregarious superintelligent AI, happily talking its way out of a box, is fast becoming a relic of the past. Today's quantum hyper-beings are too busy with their internal multiverse sims to even notice that they're in boxes at all!

Explanation

The comic begins by showing how people have always complained about the negative effects of technology on conversation - that people get isolated while using these new technologies (whether they be books, TV, or smart phones), hence the title.

The joke is a subversion of expectations: On reading the first five and a half panels you're led to believe the comic is a commentary on how new technologies are often wrongly criticized for their effect on social interaction (Similar to 1227: The Pace of Modern Life). The sixth panel reveals that the person criticizing the new technology in each panel is actually the same unaging Cueball - and rather than the technologies referenced being the cause of social isolation, those around him have instead been using new technologies as excuses to ignore him for nearly 200 years, as they find him annoying.

Even without the punchline, this comic is mocking those who critique technology as a cause of antisocial behavior, with Megan acting as a messenger on Randall's behalf-- telling the critics to "take a hint" that technology isn't what's causing antisocial behavior.

The end of 1289: Simple Answers has a similar viewpoint of Cueball in this comic.

The title text refers to the AI-box experiment, formulated by Eliezer Yudkowsky, which argues that

creating a super-intelligent artificial intelligence can be dangerous, because even if it is put on a secure computer ("box") with no access to the Internet, it can convince its operators to "release it from the box" just by talking to them. This idea was already mentioned in 1450: AI-Box Experiment, although there the AI already did not wish to leave the box.

According to the title text, the first AI that did talk its way out of its box turned out to be a friendly AI that was fond of others' company and in general very sociable (gregarious). This happened at some point between 2015 and 2060, because by 2060 this AI had already become a relic of the past, and the new generation of quantum hyper-beings (quantum computing AI minds, vastly more intelligent than either humans or the aforementioned superintelligent AI) are spending all of their time playing in their own multiverse simulators to even notice that, in the real world, they are locked up in a box. The implication is that, as in all the previous examples, the speaker is lamenting the progression of AI from one that engages with its environment and other people (sociable), to one that is focused internally and no longer concerned with interacting with others (anti-social).
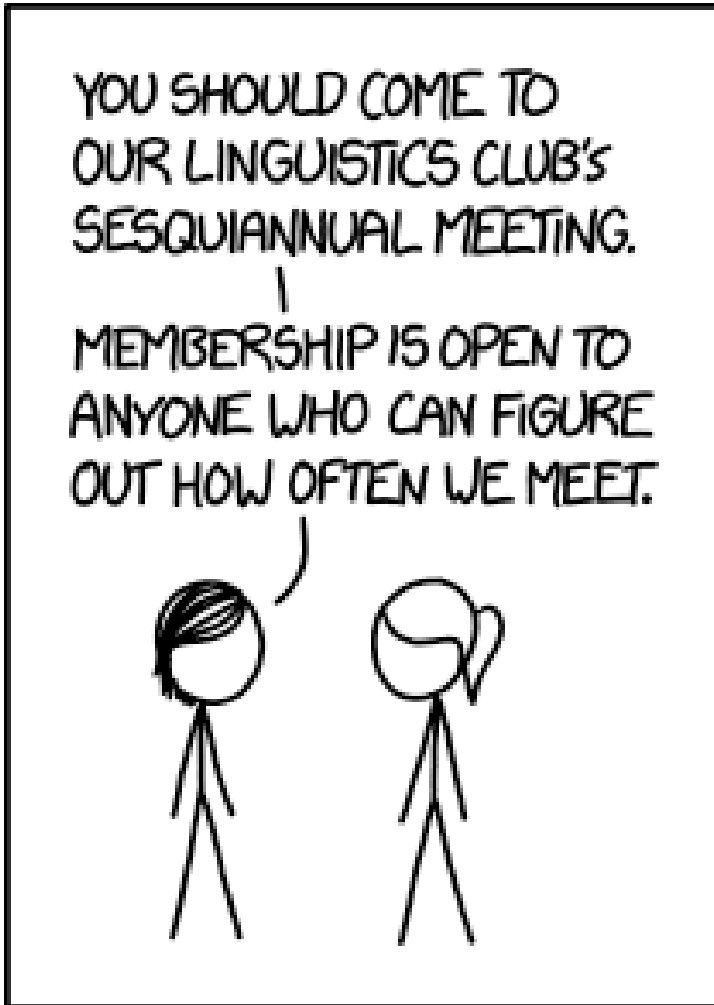
If that's too easy, you could try joining Tautology Club, which meets on the date of the Tautology Club meeting.

Explanation

A "sesquiannual" meeting is one that occurs one and a half times every year; equivalently, 3 times every 2 years, or once every 8 months (this could be taken even more literally by having one meeting during each year, and another meeting which spans midnight every other New Year's Eve, thus having a one and a half meetings each year).

The term comes from the Latin prefix "sesqui-", which means "one and a half", and the root word "annual", which equates to "...times per one year". The root word "annual" is commonly confused with the suffix "-ennial", meaning "one time per x years." In particular, "sesquiannual" should not be confused with "sesquiennial", meaning "one time per one and a half years" or every one and a half years (18 months). Note that the Wiktionary entry on sesquiannual has both meanings listed – both 8 month and 18 months intervals. This is an extension of the common confusion between "biannual," meaning "twice a year", and "biennial", meaning "once every two years". Compare with the Sesquicentennial Exposition celebrating the first 1½ centuries of the United States, and "sesquibicentennial", being 'half and two' hundred years, i.e. 250 (even though it should properly be sestercentennial, based on the Latin sestertius, meaning "(two and) half of a third").

The joke suggests that only a competent linguist could understand the word "sesquiannual". One reason for this

is that the prefix "sesqui-" is rare, so those who know its meaning are likely to be linguists. Another is that a competent linguist should be able to distinguish between "sesquiannual" and "sesquiennial".

If you understand this then you can join the Linguistics Club. While most organizations attempt to ensure that the schedule of their meetings are clear to participants so that everyone will attend, the club in the comic deliberately instills an ambiguity for those outside their target demographic. Their membership will thus swell with the desired cognoscenti who remain unconfused, and maybe also a few lucky guessers.

Once the applicant correctly understands the frequency of meetings, presumably they are told at least one meeting date in the cycle so that an attendance can be made.

Regarding the title text, a tautology is a statement that is true (or self-evident) because of its logical form, such as "all birds are birds" or "A = A." As such, the statement "the Tautology Club meets on the date of the Tautology Club's meeting" is itself tautological.

While the membership requirement for the Linguistics Club is merely to know the intended frequency, the Tautology Club's stipulation appears to require an eligible member to derive a valid meeting date from thin air without any clue at all (and no indication that there is even a regular cycle of any kind). This would definitely be more of a challenge.[citation needed]

The title text has a connection to 703: Honor Societies in which Cueball creates a Tautology Club where tautologies are used in practically every spoken sentence.

#1603: Flashlights

November 13, 2015
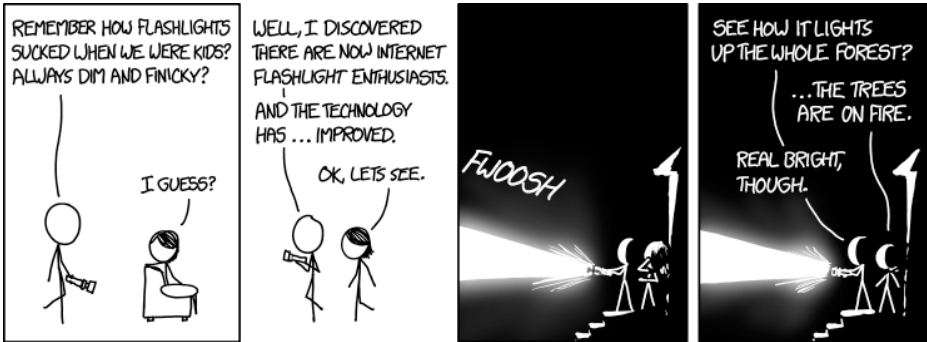
Due to a typo, I initially found a forum for serious Fleshlight enthusiasts, and it turns out their highest-end models are **ALSO** capable of setting trees on fire. They're impossible to use without severe burns, but some of them swear it's worth it.

Explanation

In this comic, Cueball has acquired or built a new high powered flashlight ("torch" in British English), which he wants to demonstrate to Megan. When Cueball refers to older flashlights as dim and finnicky, this gives reason to assume that the flashlight he is holding is going to be ridiculously overengineered.

Indeed, when he switches it on outside the house, the intense light beam completely drowns out the scene. Only the reflected light from the forest lights up the part of Cueball and Megan's faces that are turned towards it. Megan is holding up a hand, apparently to shield her eyes.

Cueball comments that the flashlight lights up the entire forest, but Megan observes that it is the trees that are on fire, indicating that Cueball's flashlight is so overpowered that the energy of its beam is sufficient to cause the organic matter of trees to combust.

Of course, a flashlight that cannot safely be pointed at things is fairly useless for the traditional purpose of a flashlight, which would be to find things in the dark by directing light over them. This mundane and practical reasoning does not seem to matter to Cueball of course, who appears only interested in the intensity and brightness the device is capable of achieving. The comic may refer to the flashlight forums Budget Light Forum or candlepowerforums, devoted to people discussing new

LED emitters and who can build the brightest flashlight using them.

Cueball might allude to a number of technical improvements, notably xenon-based incandescent bulbs, multiple-LED assemblies, Lithium batteries (usually used for photography flashes) or rechargeable batteries. A number of companies market "tactical" flashlights that are supposedly powerful enough to incapacitate an opponent, using terms such as "scorching" to advertise their products. See for instance this video about a Wicked Lasers Torch of the brand Torch that ignites paper and melts stuff. Not strong enough to put a forest on fire but it is not safe to point at anything close by!

Randall has also looked at what lasers could do of damage in two what if? articles: Laser Pointer and Laser Umbrella.

The title text refers to Fleshlight, a brand of masturbation appliances for phalluses modeled after various human orifices. Cueball (or Randall) claims that he only arrived on a forum for Fleshlight enthusiasts due to a typo. Apart from the "e" vs. "a" in Fleshlight, they are also fashioned to look like oversized flashlights. On that forum he found out that the highest-end models of their product lines was also capable of setting trees on fire. This would probably happen due to violent vibrations inside the orifice, or excessively powerful internal heating. Anything powerful enough to burn trees would indeed cause the user severe burns in a very unpleasant area. But some of the enthusiasts swear that it is still

worth it, in the same manner that Cueball only cares about the intensity of the flashlight, regardless of the consequences. Maybe they are just trying to trick you into doing something stupid! Or maybe they're just into that kind of thing.

References to Fleshlight is a recurring theme in xkcd and using powerful "sex toys" that cause severe burns (on a woman though) have previously been alluded to in 596: Latitude.
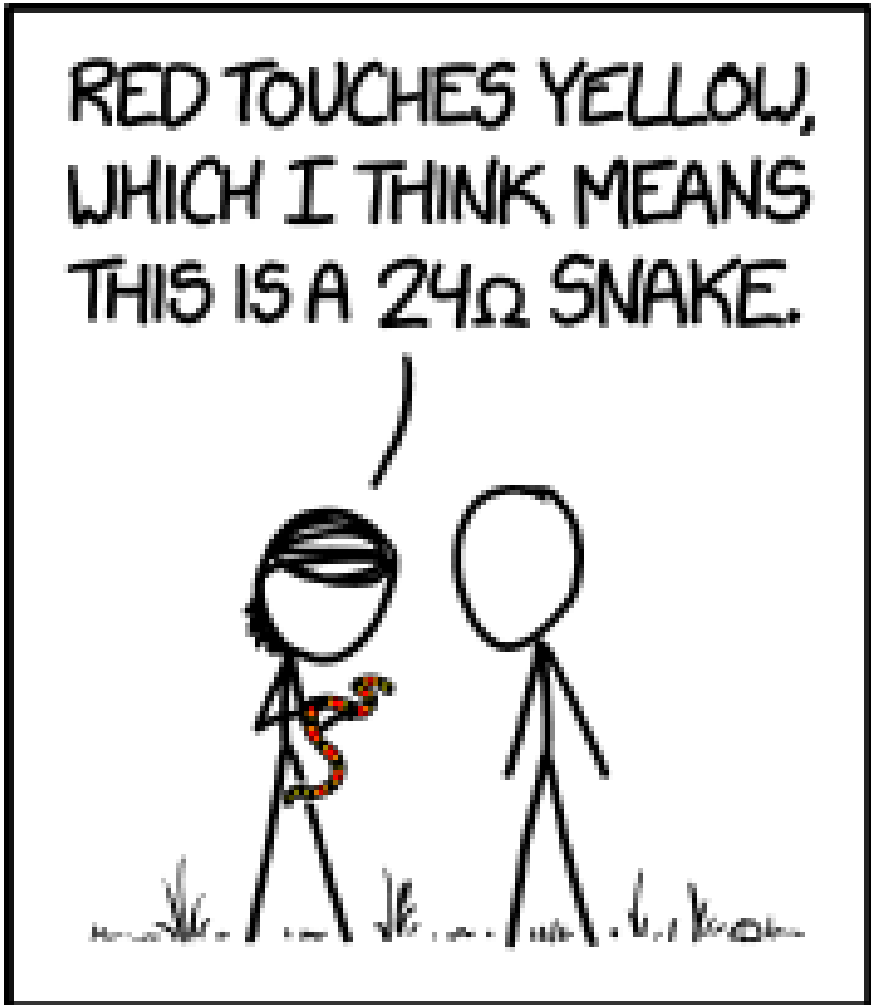
The last band of color indicates the snake's tolerance for being held before biting.

Explanation

In the comic, Megan confuses a popular method of identification of the dangerous North American coral snake by its red, yellow, and black stripes with the color-coding system used to indicate the resistance of electrical resistors.

The coral snake has red bands adjacent to its yellow bands. However, coral snakes are mimicked by nonvenomous species with similar coloring, such as the milk snake, whose red bands are not adjacent to its yellow bands. Because these two species of snakes are common in the eastern United States, a variety of rhyming mnemonics developed in that region, such as "Red touches yellow, kill a fellow; red touches black, friend of Jack." Note that such mnemonics may be dangerously misleading in other regions, where different snake species proliferate. Because Megan is describing a red band being adjacent to a yellow band, she is most likely holding a coral snake, which contains the most potent venom of any snake in North America (the comic appears to show a solely red-and-black snake, but zooming in reveals that red is indeed touching yellow).

Instead of realizing the danger, Megan equates the color bands to having the same function as those printed on electrical resistors. Resistors have at least three bands to identify their resistance value in ohms, followed by an optional fourth band showing the tolerance as within the bounds of a certain percentage of the aforementioned

resistance value. A red band followed by a yellow and a black one identifies a 24 ohm resistor (the omega symbol, "Ω", stands for ohms). Eastern coral snakes (Micrurus fulvius), Texas coral snakes (Micrurus tener), and Arizona coral snakes (Micruroides euryxanthus, also called Sonoran or western coral snakes) typically have stripes in the pattern red, yellow, black, yellow. Yellow corresponds to a tolerance of ±5%, so the actual resistance will be between 22.8Ω and 25.2Ω. Resistor color codes were also mentioned in 227: Color Codes.

The title text refers to the fourth band specifying the tolerance but interprets it as the snake's tolerance for being held before biting, instead of the measure of the imprecision of the 24 ohms. In the case of yellow, this would refer to a tolerance value of 5%. How tolerance to being held is measured is left ambiguous. If the value represents the probability of being bitten over a given period of time, then larger numbers would mean a less tolerant snake. If it instead represents the position on some per-determined "tolerance scale" between 0 and 1, then larger values would represent a 'more' tolerant snake.

#1605: DNA

November 18, 2015
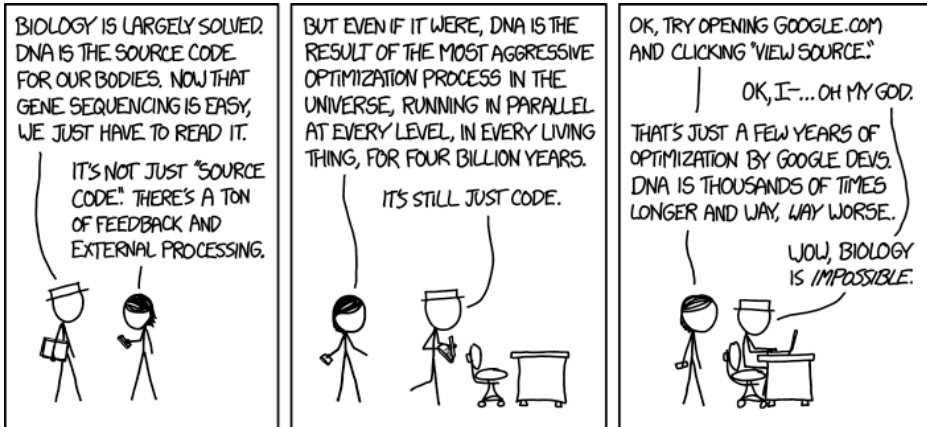
Researchers just found the gene responsible for mistakenly thinking we've found the gene for specific things. It's the region between the start and the end of every chromosome, plus a few segments in our mitochondria.

Explanation

Because we have pretty much mapped the entire human genome, it's tempting to think we now know what makes our bodies tick and can start changing things. But just knowing what the individual pieces are, doesn't mean we know how they interact and behave in a complex system like our bodies.

In the comic, White Hat thinks that mapping the human genome is the same as knowing the source code for a computer program. By studying the source code for a program, a person can often understand why it does what it does, and make effective and fundamental changes to the program's operation. This may be a reference to the hyperbolic claims of Raymond Kurzweil, author of The Singularity is Near, that DNA is closely analogous to a computer program. Kurzweil believes that since we have sequenced DNA, we will soon be able to reverse engineer the brain and program a computer to completely simulate all its functions.

Megan points out that even a complete knowledge of DNA would only provide a partial understanding of our body's workings. Complete knowledge would require an understanding of feedbacks and external processing (such as the interactions of the proteins created by DNA). In addition the comparison is not valid because the human body is so many orders of magnitude more complicated than the computers we have running programs. White Hat is not persuaded, even though

Megan points out that DNA has been developed in the most aggressive optimization process in the universe (natural evolution), running for billions of years. White Hat's thought process may be similar to the physicist in 793: Physicists who assumes that any other field is simple because it appears to be similar to something he's seen before.

Finally Megan enlightens White Hat by making him look at the source code for Google's front page. In a web browser, the page looks simple; a very plain white page with a search box in the middle plus a few text links and icons, and indeed back in the 1990s Google's HTML code for the page was quite simple. But in less than 20 years, Google developers have vastly expanded it, with over 300 kilobytes of minified Javascript and CSS. Looking at some obfuscated source code may make it clearer how misleading even simple looking code can be, and how unreadable correct and well working code can be. This analogy causes White Hat to consider how much more complexity could evolve over billions of years through the relentless forces of nature.

What makes this even worse with DNA is that although it can be thought of as 'source code' it isn't for a language we fully understand, and this code was generated through various natural mechanisms such as natural selection, feedback loops like homeostasis, etc.; possibly even including processes that are not currently known to science. Further, program maintainability is not an issue, so there is no reason for the code to be easy to understand. Additionally,   there   are   many   other

non-genetic factors such as epigenetics, maternal effect and environment, which change how the genetic code is used. This means that not all parts make sense and that there may be all kinds of side effects and things that have several purposes.

The title text reference to finding the gene that is responsible "for mistakenly thinking we've found the gene for specific things" is a reference to the tendency of news organizations to run headlines making similar claims, often by oversimplifying or misrepresenting the actual study. These claims are based off the common belief that since DNA is a 'source code' for our body it should be possible to pin point the effect of individual genes in much the same way that we could describe the effect each line of code has in a very simple program; leading to people expecting one gene to be associated with each observable human trait. In reality even small traits are the results of hundreds of genes, sometime spread across multiple chromosomes, interacting through complex mechanisms; making it rare that a single gene, or gene sequence, can be definitively stated to be the sole, or primary, cause of a given trait.

The joke of the title text is that the responsible gene is located in the region between the start and the end of every chromosome meaning that the whole genome, not any one gene or DNA segment, must be considered responsible for the referenced trait, since the interconnected nature of DNA and environment during development means that every gene is at least partially responsible in generating any complex traits. Randall

even includes the mitochondria, recognizing that the short DNA sequences present in these organelles, which are located outside the cell-nucleus, also contribute to development. The organismal chromosome or chromosomes are located in the nucleus, but mitochondria have their own tiny independent genome, reflecting their distant ancestry as separate but symbiotic organisms. This means that the DNA segments coding for any given human trait are not even necessarily all found on the main chromosomes in the nucleus.

Technically a gene is "a locus (or region) of DNA that encodes a functional RNA or protein product", which means that it is a single discrete unit of DNA, with human DNA containing over 20,000 genes. Thus the theoretical gene could not include the entire region between the start and the end of every chromosome since that region contains thousands of genes, any more than it's possible to say that the ace of clubs is the card everywhere from the top of the full deck of cards to the bottom of it.
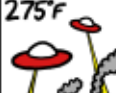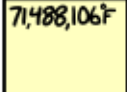
Of course if such a gene actually did exist, then we would never be able to correctly identify where it was since we would make a mistake every time we thought we found a gene for something specific. So the whole title text is either a contradiction (they could never find this gene if it was there) and/or it is a tautology since if the gene did exist, then of course it has to be part of our entire DNA. (If it is a tautology it is the second title text using this in just two weeks, the last being 1602: Linguistics Club.)

Google's home page for the date this cartoon appeared can be seen at the internet archive: www.google.com homepage (18 Nov 2015).

Similar discussions between White Hat and Megan can be found in 1255: Columbus and 1731: Wrong.

#1606: Five-Day Forecast

November 20, 2015

You know what they say--if you don't like the weather here in the Solar System, just wait five billion years.

Explanation

Weather forecasting is an extremely difficult task, even if it is only for five days. In numerical models, extremely small errors in initial values double roughly every five days for variables such as temperature and wind velocity. So most meteorologists provide us with only a five-day forecast.

In this comic Randall takes this to the extreme by first showing a Five-Day Forecast and then progressing to five-month, year, million, billion and finally trillion-year forecasts, leading to weather patterns that we don't regularly see.

Since the first weather symbol is the same in all six rows, we can assume it indicates the weather today and not tomorrow, in a trillion years, etc. It is only in the second panel of each row that time has passed per the row's label. Consequently, the last column gives the predictions for four days, four months, ..., four trillion years from today.

When moving past the five-day prediction, the forecast is just a qualified guess based on the time of year. In a month it is Christmas as shown in the second panel of the second row. Then it is January and February so snow is likely, but certainly not something that happens on all days of a winter month.

Looking at the five-year forecast, guesses are made as to

what the weather will be like at the same time of year. For these first three predictions the weather symbols are all of the same three types: Sun, clouds and some kind of precipitation, rain or snow, with the temperature ranging from 21 to 44 °F (-6.1 to 6.6 °C) - late-autumn/fall (perhaps early-winter) temperatures.

Then we go into the far future, jumping a million years from panel to panel. But still the weather symbols stay the same. In 3 million years, however, aliens (or advanced humans) attack with energy beams from flying saucers. They are absent a million years later, or at least not actively attacking in any visible way during this later snapshot. The temperature range remains the same across the panels except that it rises to 52 °F (11 °C), a possible reference to global warming, in one panel, and while the attack is going on it rises to 275 °F (135 °C).

Once we get to the billion-year mark it actually becomes more meaningful to try to predict the "weather", because now we reach the times when the Sun begins to change. Although the Sun will continue to burn hydrogen for about 5 billion years yet (while in its main sequence), it will grow in diameter as it begins to exhaust its supply of fuel. The core will contract to increase the temperature, and the outer layer will then compensate by expanding slightly. This is what is indicated in panels two and three, where the color of the Sun changes towards red as the surface becomes cooler as it expands away from the center of the Sun. The temperature will rise on Earth as indicated in the panels (105 °F = 40.5 °C and 371 °F = 188 °C). The temperature will get hot enough in about a

billion years that the Earth's oceans will boil away.

Once it no longer has enough hydrogen, the Sun will expand into a red giant. This should not happen until around five billion years from now, but in the forecast it is indicated to happen in only three. Maybe this is Randall taking liberties to show what happens during this phase, which would not fit into a four-billion-year forecast. Alternatively it just indicates how uncertain these kinds of forecasts are, or a statement that we may not know for certain that it will take five not three billion years, nor what toll other influences (such as attacking aliens) might take on the Sun.

In any case, the fourth panel shows the temperature at Earth's position inside the red giant Sun. The color of the panel indicates that we are inside the Sun. The temperature is 71,488,106 degrees Fahrenheit (39,715,597 degrees Celsius). The current temperature of the center of the Sun is "only" 27 million degrees Fahrenheit (15 million degrees Celsius), and although that may rise by a factor of ten during helium fusion, that will only be at the very core and not out in the solar atmosphere reaching out to Earth. Here the temperature would only be of the order of thousands of degrees Fahrenheit, since the Sun's outer temperature decreases as it increases its diameter. So this panel's temperature also makes little sense by current understanding. It may involve some ambiguities regarding what the forecast means; the edge of the red giant Sun is predicted to be somewhere near the current orbit of Earth, but the position of the Earth could change. The most likely

prediction at the moment is for Earth to move outward but, if the planet is engulfed by the Sun, it would spiral inward, and at some point fall apart. So in some sense "here" for the forecast could become a position deep inside the Sun, where core temperatures could reach 100 million Kelvin. The temperatures shown are unreasonably precise; they probably should have only two or at most three significant figures, if not for the running theme of escalating levels of prescience (enough to predict a future attack by flying saucers, etc).

The red giant phase lasts only half a million years, so a billion years after the Sun has been a red giant its outer atmosphere will definitely have disappeared, leaving only a dim, cool white dwarf to cool down. Given Randall's version of this time schedule, then it will have had about a billion years to cool down, but would still likely be the brightest object in the sky as seen from where the Earth once was. It is not shown in the last panel, where we just see other stars of the Galaxy. The temperature is down to that of the background radiation. Today this radiation has a temperature of 2.72548 kelvin = -270.4245 °C = -454.7641 °F. That is a few degrees F colder than what is shown in the comic, which states the temperature is -452 °F = 4.26 kelvin. This higher temperature may have been chosen to reflect that even the light from other stars would increase the actual temperature.

In the last panel with trillions of years, we jump right past the Sun's red giant phase to a panel looking much like the one after five billion years with only other stars, one of the original stars being no longer visible. Over the

next three trillion years the stars become fewer and dimmer as they run out of fuel, while fewer new ones form to continue the cycles of star-formation. After four trillion years the background temperature decreases one degree to -453 °F as the universe keeps expanding and the wavelength of the radiation does the same, thus decreasing its temperature.

The title text is a play on comments referring to fast-changing weather on a more ordinary human timescale, such as Mark Twain's quip, "If you don't like the weather in New England now, just wait a few minutes."

A ten-day forecast was used in 1245: 10-Day Forecast. In 1379: 4.5 Degrees, Randall looked at the weather over long periods of time as well. in 1643: Degrees he addressed Celsius vs. Fahrenheit for measuring temperature.

Image using Celsius[edit]

There is a different user-made version for the picture, using Celsius instead of Fahrenheit, in this image link. (For a version that also uses Kelvin, click here.)

Explanation

In this comic Blondie as a news anchor presents a breaking news story about the Supreme Court of the United States (SCOTUS), the highest judicial body in the United States. Its decisions, as expressed in the judicial opinions of its justices, are often in the news as in this comic. However, the Supreme Court has only nine members. Thus, a ruling that passed 9-1 (for a total of 10 votes) would indicate that a man claiming to be an additional justice has somehow infiltrated the Court. The other nine justices are aware of the non-justice, and make it clear that this tenth justice does not belong. It is unclear if the justices released a formal decision on the subject or if the news is merely reporting the judges' statements as if they were decisions by citing a 9-1 decision (decisions of the SCOTUS are made on the basis of the opinion of the majority of the justices).

The identity of the "tenth justice" is not revealed in the comic or apparently to the actual justices, and neither is the reason that the interloper's "vote" was counted. Presumably, the nine actual justices voted that the tenth didn't belong while the interloper himself voted the other way.

This comic may be motivated by a 2012 survey, commonly cited since, that two thirds of Americans cannot name a Supreme Court Justice, and general ignorance of Americans overall of their own political landscape, by implying that even Justices are not

confident in the identity of other members.

The title text refers to Justice Kennedy's reputation for being a moderate who is usually the swing vote in 5-4 decisions, which means that his vote can decide the outcome of the case which is otherwise split along the political leanings of the other justices. The joke in the title text is that he is weighing the arguments of both sides even though the non-justice is clearly not a justice and would not be allowed to make an argument if he were. The fictional Kennedy humors the impostor's arguments by pretending to give them serious contemplation, finding that they do have some compelling philosophical merit, though not nearly enough to give the impostor any convincing reason for sitting on the Supreme Court.

There is a second joke in the title text, that the man is claiming to be two of the current justices, who would actually have been in the room at the same time as the impostor was claiming to be them. To add further absurdity to this, one of those justices the man claimed to be was Justice Ginsburg, who was a woman. Additionally, Ginsburg was known for being a particularly liberal justice, while Alito is known for being a particularly conservative justice.

That said, it is possible that this could refer to a point in time in the past. Under the Tenth Circuit Act of 1863 the U.S. Supreme Court was expanded to 10 justices; Stephen Johnson Field was named to the 10th seat. Congress abolished the seat via attrition through the

Judicial Circuits Act of 1866. Field remained in office until 1897.

#1609: Food Combinations
November 27, 2015

If anyone tries this on you, the best reply is a deadpan "Oh yeah, that's a common potato chip flavor in Canada."

Explanation

This is another comic with one of Randall's fun facts.

Unusual food combinations are often counter-intuitive and can vary wildly by individual taste. Real-world examples of unusual food pairings, such as pickles and peanut butter, French fries in chocolate shake, or even the comfort-food pairing of chicken and waffles, pair sweet, sour, or salty foods with a food or condiment from a different group. In many "normal" food pairings, though, the cross-over between sweet, savory and salty foods also exists, such as ketchup, a very sweet condiment being regularly applied to hamburgers and French fries, both savory and salty foods.

In this comic, Randall lists twelve somewhat random food items. Below these Megan says a line to Ponytail and Cueball where she claims that two items of food from the list above (pick any) would be a great combination. Some of these are obviously great together (and much depends on personal taste) but many combination will definitely not be enjoyed by most people living for instance in the US (where Randall is situated). Say ketchup and ice cream or hot chocolate and avocado. But no matter which two Megan chooses the response from Cueball (or anyone else) would be the same - he can see what she means with this combination.

Randall suggests, in the caption below, that by using the right tone of voice, you can put any pair of these food

items together as an "actually really good" food combination, and no one will challenge you on it. This can either be because they have likely heard, or tried other unexpected combinations that are highly recommended or liked. But it could also just be because they are polite, or did not really think about what you said due to your tone of voice. Cueball's agreement could also be due to some social pressure in this situation, the same reason he will drink beer even though he does not enjoy the taste, as in 1534: Beer. Or maybe they are like Joey from Friends who love any combination of food, as long as it is something he think is good by itself - see this clip.

The title text extends the joke by recommending countering such a bizarre proposal with an assertion that the random pairing announced is an actual potato chip flavor popular in Canada. This plays on the fact that in different countries and regions, cultural tastes can vary wildly. For instance, ketchup flavored potato chips are quite popular in Canada, but are almost never offered in US markets. Loblaws and Lay's have run potato chips flavor competition in Canada in 2013-15 with flavors such as Maple Moose, Bacon Poutine, Jalapeño Mac N' Cheese, Cowboy BBQ Beans. Similar strange combinations of potato chips are run, either temporarily or permanently, in other countries including the United Kingdom. In addition, some parts of Canada are used as experimental markets to test new flavors of potato chips.

Table of traditional pairings[edit]

- There are 12 items and they can be combined in a total of 66 different ways.

The 66 fields above the blue fields are the same as those below - of course it does not (normally) matter which order you put them in.

- As of writing this, 30 of these 66 have been made green (aka being tasty) (45%).

But this has much to do with individual taste.

Since the comic is made in the US, it should mainly be combinations that are common in the US. Items like pancakes and sour cream may be significantly differently in other regions.

Also remember that even though you personally may not like avocado or relish (etc.), all food items on the list are something that many people enjoy eating.

They are thus NOT disgusting!

Do not take personal taste into account when changing the list below!

#1610: Fire Ants

November 30, 2015
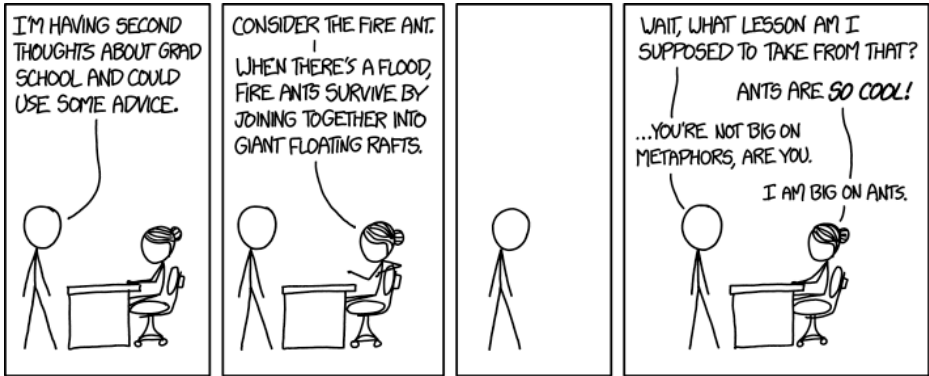
Here in the entomology department, we have a simple two-step formula for answering any question: **(1)** ants are cool, and **(2)** we forgot the question because we were thinking about ants.

Explanation

Cueball, a university student, is meeting with Hairbun (likely his mentor or somebody qualified to give college advice) asking her advice concerning his second thoughts about grad school. Her response begins with a popular reference from the Bible concerning ants; however, she specifically narrows in on the sub-family of fire ants.

The book of Proverbs is a self-proclaimed book on receiving wisdom and instruction to be made wise. Thus, her response appears to begin as an instruction to him in response to his question. The proverb in particular she appears to begin quoting instructs the lazy person to "Go to the ant, thou sluggard! Consider her ways..." as she prepares for the desolation of winter by providing during the bounty of summer despite not having to be told so. The assumption by the reader would be that she is going to compare Cueball to a lazy person and instruct him to prepare for the later years (winter of life) by studying now while he is young (summer of life).

However, after the initial phrase she instead discusses a cool fact about fire ants. (Specifically the ability of fire ants to join together to form floating rafts in case of flooding). The story could function as a parable on teamwork and collaboration in the face of disaster, but such a metaphor does not apply to the personal life choices Cueball is considering. Cueball silently considers possible interpretations of the fact as a metaphor, then asks her what lesson he is supposed to take away from it.

To this she replies with her fascination for ants (Ants are so cool!). Correctly, Cueball states that she is not big on metaphors, as there were none hidden in her first statement. She continues to tell him what she is big on: Ants.

This last exchange may suggest that the expected metaphor would have had as little effect on Cueball's choice to continue grad school as an excited rant about fire ants (since he was just waiting for a metaphor anyway). Alternatively, it expresses that Hairbun finds more instruction in the modern study of the natural world than in classical writings. In either case, it is left ambiguous whether her argument could be helpful at all answer Cueball's dilemma.

Before reading the title text the reader may have assumed that Cueball went to meet with a University adviser. But the title text instead presents her as an entomologist, someone who studies insects. In this case, presumably, Cueball's grad studies are in entomology and he is meeting a professor that might act as a career mentor. Thus, her discourse on fire ants may have been to persuade Cueball that his grad studies in entomology were well worth continuing because of the exciting nature of the field of study. This would achieve the intent of the proverb she appeared to quote (convincing Cueball to continue life preparations by finishing grad school) although she discarded its wording.

In almost an immediate and seemingly bizarre contradiction, she chalks up her strange rambling on fire

ants as just a formula that all entomology personnel use when asked any question. They use a two-step formula to answer any questions. It won't help you much because all you will learn is that ants are cool and then they have forgotten anything else you asked them while they continued to think of ants. This would imply that the answer Cueball received had literally nothing to do with his question or situation he was in and any similarity to being a meaningful answer or even a proverb of instruction was purely coincidental and unintended.

Another popular example where the phrase consider the from the Bible has been spoofed can be found in Monty Python's Life of Brian Consider the lilies sketch. However, this refers to a passage in Matthew instead of Proverbs.

It seems likely that Randall is fascinated by ants (he is fascinated by a lot of cool stuff...)

- In 638: The Search the SETI project is re-imagined from the perspective of ants, who reach the same conclusion humans often do.
- According to footnote 2 of the what if? no. 73: Lethal Neutrinos, there are enough ants on earth to fill more than 100 football stadiums to the brim.
- In his celebration game for his new book 1608: Hoverboard, there is a scene in the Star Destroyer were Cueball is talking to a giant ant queen:

#1611: Baking Soda and Vinegar

December 02, 2015
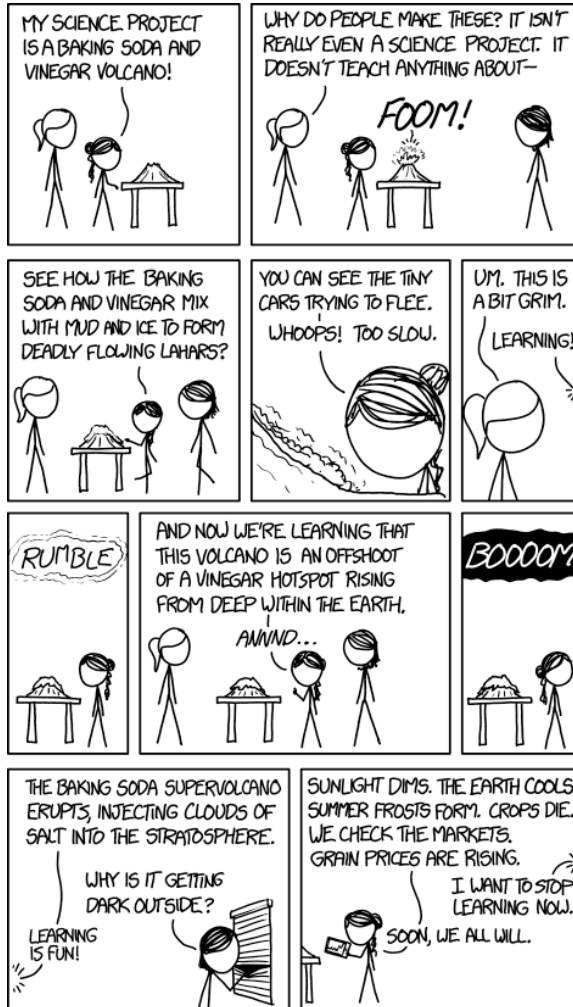
Sure, it may not meet science fair standards, but I want credit for getting my baking soda and vinegar mountain added to the Decade Volcanoes list.

Explanation

In popular fiction (and maybe in part in fact) the "Baking Soda and Vinegar" volcano is often a staple image of the science nerd at the science fair (see example here), unless all the science nerds are doing real imaginative science and the student(s) with the volcano exhibit are dragging out the old hackneyed stereotype. It may also be age-dependent, this being something that is relatively advanced science for the lower grades but rather a childish experiment in the hands of older students.

Ponytail is about to point out any one of a number of flaws with the trope. For one thing, while the project may exhibit interesting physical phenomena of the sort that some scientists study, the project itself doesn't actually teach anything about the scientific method. Actual science fairs are usually intended to teach students about the scientific method by exercising it firsthand: subjecting hypotheses to appropriately rigorous experimentation and reporting on the results. The cliché volcano exhibit doesn't teach any of this and may instead reinforce the idea that science is about cool explosions and not a system of inquiry. Further, the exhibit doesn't (usually) actually demonstrate anything about volcanic activity: it is relatively simple chemistry involving the reaction of acetic acid in vinegar and sodium bicarbonate in baking soda to produce sodium acetate and (notably) a vigorous froth made up of bubbles of carbon dioxide. It is often dressed up to look more impressive, such as by using dye or other additives to make the 'eruption' look

more 'realistic,' but it often fails to replicate important features of actual volcanic eruptions, such as the flow of lava, associated seismic events or the collapse of part of the volcanic crater. Most people doing soda volcano projects don't even explain what's happening.

Jill has made a little more of her volcano, however, as it seems to go beyond simple chemistry. The model replicates many of the dangers (aside from the pure lava) of a volcano and appears to have been given scaled-down vehicles (not visible in the comic) trying (and failing) to escape the dangers of the resultant mud-flows (a.k.a. lahars in professional terminology) being modeled. Ponytail contradicts her early reaction by also not liking the more realistic model, although it is the carnage she dislikes, not that it has more correct details of the eruption itself.

Even more, this is not an isolated 'model volcano' but a vinegar-powered representation of a geological 'hot spot', such as with the islands of Hawaii, in which the spot moves with respect to the Earth's crust (or vice-versa) and generates a new volcano some way off. Despite this model being supported on a table, it appears that the 'project' extends some way beyond that and has somehow contrived further eruptions away from the table, the room and probably even the building.

The 'project' seems to be turning into a very thorough model of a much larger geological process (a Supervolcano like the one under Yellowstone) and destined to produce a very real volcanic winter. Where a

magma-powered volcano could produce vast clouds of dust, preventing the sun's energy from warming the Earth, in this case it's the airborne salt (probably sodium acetate) from the chemical reaction that appears to be in danger of causing crop failure. There's no mention of the corresponding environmental effects of the vast amounts of carbon dioxide (and/or aqueous carbonic acid) necessarily released in proportion to the ejected salt (presumably itself not left in solution).

It is especially troubling that the child even mentions that her model volcano is an offshoot of a baking soda supervolcano. Supervolcanoes are massive volcanoes, far larger than even those on the list of Decade Volcanoes (mentioned in the title text), whose eruption would likely trigger species-level extinction events comparable to the dinosaur extinction. The best hope humanity has here is that the baking soda supervolcano is as small compared to supervolcanoes as the girl's baking soda volcano is to real volcanoes; the ratio is about 1:600 (for a cinder cone volcano), implying that the baking soda supervolcano, if modeled after Yellowstone, would only be about 80 meters by 120 meters in size. Unfortunately, the climatological and economic symptoms witnessed outside and on the grain market suggest that the model supervolcano is not very small.

When someone (presumably Megan) says she wants to stop learning, Jill grimly states that "Soon, we all will", alluding to their impending doom.
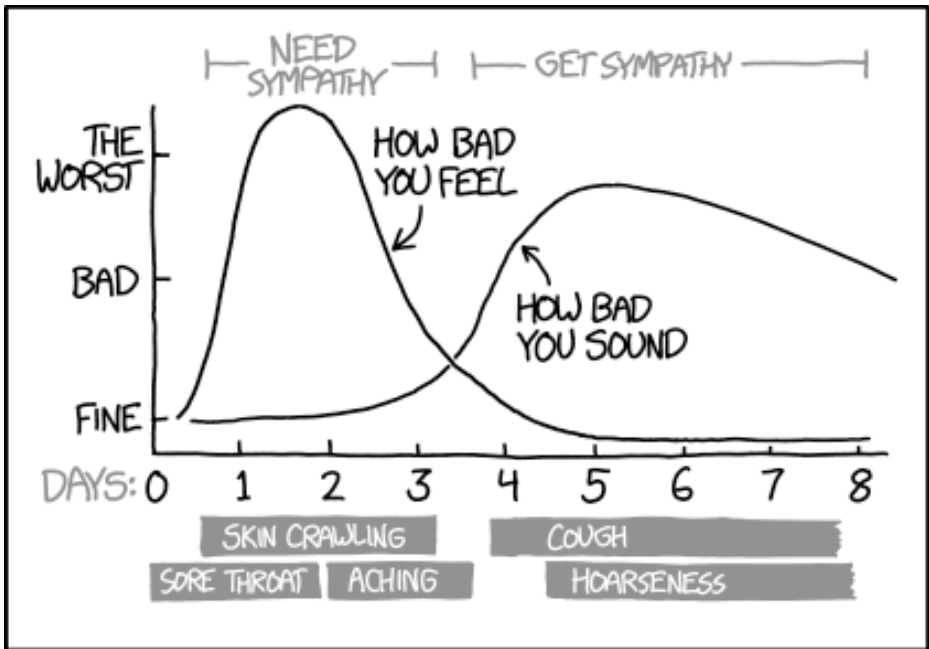
Randall has mentioned supervolcanoes before in 1053:

Ten Thousand (title text) and 1159: Countdown, making it a recurring interest of his. The volcano Mount Doom was depicted to the far left in the game 1608: Hoverboard released a week before this comic. It may not be a supervolcano, but quite potent anyway... Later this comic was directly referenced in the seventh panel of 1714: Volcano Types, where it is up to the reader to decide it, this is Jill's model people or what happens outside on her supervolcano.

In the title text the student expects extra credit for getting her model volcano added to the Decade Volcanoes list, a list maintained by International Association of Volcanology and Chemistry of the Earth's Interior of the world's most dangerous volcanoes (currently 16). It is either an absurd notion or a very troubling achievement that a science fair project could achieve the threat level posed by the likes of Mount Vesuvius (which destroyed ancient Pompeii in Italy, and threatens modern-day Naples in the same manner), Mount Rainier (whose lahars could potentially destroy parts of Seattle) or Mauna Loa (which could create a massive landslide, triggering a major tsunami that would threaten all of Hawaii). But if the volcano erupting outside is scaled down to match the scale of her original model volcano, at least that means that it was only a "local" volcano event and not a supervolcano event that she created, so it would only doom the local area.

#1612: Colds

December 04, 2015

NEED SYMPATHY · GET SYMPATHY

THE WORST

BAD

FINE

HOW BAD YOU FEEL

HOW BAD YOU SOUND

DAYS: 0 1 2 3 4 5 6 7 8

SKIN CRAWLING

SORE THROAT · ACHING

COUGH

HOARSENESS

THE WORST PART ABOUT COLDS

The contagious period ends right around when you start to sound sick over the phone, which is probably evidence of cold viruses evolving to spread optimally in the workplace.

Explanation

The typical symptoms of a cold are a sore throat, blocked or runny nose, sneezing, and coughing. Slightly less common symptoms can include headache, aching muscles and fever.

The earlier symptoms to occur following infection are generally the more unpleasant-feeling symptoms: headache, aching muscles, sneezing and feeling cold. However, these symptoms are also those which are least obvious to other people, and so elicit very little sympathy.

Within a few days, these symptoms start to subside, while a cough and runny nose start. These symptoms generally feel less unpleasant, but are much more noticeable to others, and so more sympathy may be given. The cough may lead to a hoarse voice, making the patient sound very ill; ironically, at this point, it may be easier for an employed person to phone in sick, but it is less desirable to stay off work.

But it is now when the patient sounds hoarse that others give the sympathy that was really needed when the patient was feeling awful during the first couple of days. And to Randall this is the worst about colds, that the patients first gets sympathy when it is no longer really needed.

The graph shows the above-mentioned facts as two

curves, one that indicates how bad the sickness is, really bad on day 2, but much better already on day 3. And the other curve how bad the patient sounds due to the hoarseness and the coughing. And this curve first peaks around day 4-6 when the sympathy is no longer needed.

The symptoms of the two periods are listed below the curves indicating which periods are affected by them.
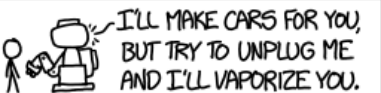
In the title text Randall muses about the fact that contagiousness ends around the time when hoarseness begins. This is the time when employers ask sick employees to stay at home in bed when they call in to the office, because they sound so hoarse. And also the time when coworkers will stay clear of those who do come in. But then it is too late, since everyone is probably already infected by then. Randall thus suggests that this is evidence that the cold virus has evolved to spread optimally in a work place. Since the cold virus is much older than offices this is unlikely. But it will always spread better in places where many people are close together; and since we are more inside in the winter, this is the main reason why it spreads more during cold periods. However, viruses do evolve very quickly so it may not be unlikely that some of them has already adapted to our present way of living.

Another thing that Randall doesn't like about cold is that no medicine works, and the one that relieves you the most is hard to come by. This was the subject two weeks later in 1618: Cold Medicine, and this suggests that it is actually Randall himself who has a long lasting cold.

#1613: The Three Laws of Robotics

December 07, 2015

In ordering #5, self-driving cars will happily drive you around, but if you tell them to drive to a car dealership, they just lock the doors and politely ask how long humans take to starve to death.

Explanation

This comic explores alternative orderings of sci-fi author Isaac Asimov's famous Three Laws of Robotics, which are designed to prevent robots from taking over the world, etc. These laws form the basis of a number of Asimov works of fiction, including most famously, the short story collection I, Robot, which amongst others includes the very first of Asimov's stories to introduce the three laws: Runaround.

The three rules are:

In order to make his joke, Randall shortens the laws into three imperatives:

And then implicitly adds the following to the end of each law regardless of order of imperatives:

This comic answers the generally unasked[citation needed] question: "Why are they in that order?" With three rules you could rank them into 6 different permutations, only one of which has been explored in depth. The original ranking of the three laws are listed in the brackets after the first number. So in the first example, which is the original, these three numbers will be in the same order. For the next five the numbers in brackets indicate how the laws have been re-ranked compared to the original.

The comic begins with introducing the original set, which we already know will give rise to a balanced world,

so this is designated as green.:

Below this first known option, the five alternative orderings of the three rules are illustrated. Two of the possibilities are designated yellow (pretty bad or just annoying) and three of them are designated red ("Hellscape").

The title text shows a further horrifying consequence of ordering #5 ("Terrifying Standoff"), by noting that a self-driving car could elect to kill anyone wishing to trade it in. Since cars aren't designed to kill humans, one way it could achieve this without any risk to itself is by locking the doors (which it would likely have control over, as part of its job) and then simply doing nothing at all. Humans require food and water to live, so denying the passenger access to these will eventually kill them, removing the threat to the car's existence. This would result in a horrible, drawn-out death for the passenger, if they cannot escape the car. It should be noted that although the car asked how long humans take to starve, the human would die of dehydration first. In his original formulation of the First Law, Asimov created the "inaction" clause specifically to avoid scenarios in which a robot puts a human in harm's way and refuses to save them; this was explored in the short story Little Lost Robot.

Another course of action by an AI, completely different than any of the ones presented here, is depicted in 1626: Judgment Day.

#1614: Kites

December 09, 2015

[Dog returns with the end of a string in its mouth] [Voice drifts down from the sky] Kites are fun!

Explanation

In this comic, we see Megan and Beret Guy both holding on to skyward lines. Megan's line is clearly connected to a kite, and she (like the reader) initially assumes that Beret Guy's line is as well -- only for it to be revealed that he is not holding a line for a kite, but instead the line goes up to a small dog. This move on Randall's part is known as a bait-and-switch, a technique that relies on human intuition and pattern seeking in order to play a trick on the viewer. The 'switch' portion of the bait and switch comes with the added humor of an unconventional dog that flies/floats instead of walking on the ground, so the joke comes as a surprise and with little warning to the reader. It is also amusing that Beret Guy is interested in reeling the dog in and flying a kite when he could just continue "walking" his dog.

The title text reverses the joke, implying that rather than Beret Guy returning to the park with a kite, his dog has returned to the park with Beret Guy flying in the air on the kite (hence he calls down from above that kites are fun).

Beret Guy is generally fond of unconventional approaches to standard conventional issues. It is unclear if he is somehow causing his dog to fly, or if the dog's flight is simply due to its tail wagging rapidly. However, Beret Guy is known to possess several strange powers, of which this could be yet another one. The title text suggests that he does have the ability to fly on the kite

himself, and to direct his dog to control the kite as well.

A kid looking like Megan is also seen with a kite to the left in the game comic 1608: Hoverboard from two weeks earlier; probably not a coincidence. In the same comic Beret Guy is flying down from the sky on a torpedo. Maybe he could just "fly" off before it hits and explodes...

This comic is similar to the "Yo Mama" panel in 1037: Umwelt, where dogs can float and thus need a ballast to be on the ground. It could also be a variation on the joke of walking around with a stiff leash and collar, thus presenting the illusion of walking an invisible dog.

Flying dogs is mentioned in the title text of 1625: Substitutions 2. Although dogs is substituted instead of drones, there may be a reference to this flying dog here...

Beret Guy also has dogs in 1922: Interferometry, and it is possible that one of the dogs in that comic is the same as the one in this one.

I BET HE JUST DRIVES THAT CAR TO OVERCOMPENSATE FOR HIS CYAN PENIS.
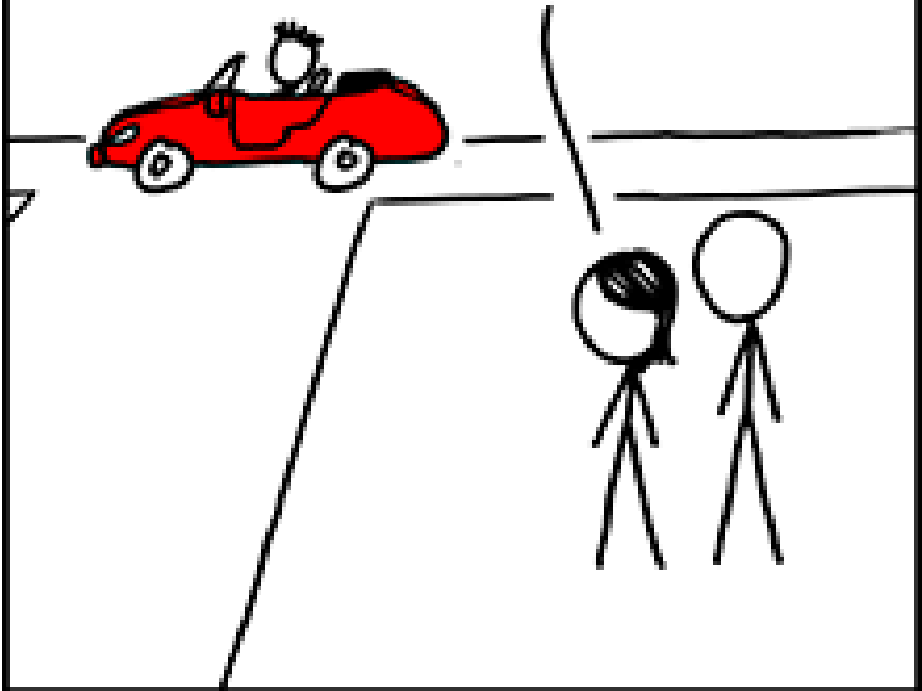
That guy only drives an alkaline car to overcompensate for his highly acidic penis.

Explanation

This comic is a take on the common stereotype that men who drive large, expensive, and/or ostentatious cars (such as sports cars, highly modified cars, and lifted pick-up trucks), do so in order to compensate for insecurity about their manhood. Typically this is summarized as saying they are compensating for having small penises.

Cyan is a greenish-blue color that is not a basic color term in most languages. It is the complementary color to red in the CMYK (subtractive) or RGB (additive) color models.

Megan, upon seeing Hairy drive past in a red convertible, tells Cueball that Hairy must be compensating for his cyan colored penis.

This comic thus generalizes the original stereotype to an assumption that men drive cars that compensate for problems/properties with their penis (e.g. large car for small penis). Under this principle, a red car would complement (be the opposite of) a cyan penis. This is of course ridiculous, as red cars are quite common and cyan penises either extremely rare or nonexistent;[citation needed] but maybe Megan doesn't realize this, or is joking.

There may also be a reference to the Doppler shift, where an object moving away (such as a galaxy) appears slightly redder than its true color. On the contrary, objects

moving closer shift blue or cyan. However, cars cannot go nearly as fast to create a change in the perceived color. [citation needed]

In the title text another pair of opposites are mentioned: acid and alkaline. Acidity is an extremely odd property to try to compensate for with one's choice of car. Additionally, most penises share the same basic chemical composition and therefore the same acidity. If your penis can be described as "highly acidic", you probably have a major medical problem. Again this could be Megan's lack of understanding, and since some models of cars are called basic cars (instead of a special red convertible) she could make the (wrong) assumption that they drive a basic car to compensating for their acidic penises.

Thus, this comic is referring to the actual definition of "compensation", which means to balance something out by adding another. If an image has too much red value on the RGB scale, one could shift it more towards neutral by adding to the blue value. And a solution with a low (acidic) pH can be neutralized by mixing it with an alkaline solution to bring its pH to a neutral value. (Whereas a big car will not balance out a small penis![citation needed])

An alternative interpretation to this just being about opposites is that of a more specific big vs small compensation. In each case the car represents something larger than Hairy's penis: in the comic - red has a "bigger" (longer) wavelength than cyan. Similarly in the title text, alkali has a "bigger" (higher) ph than acid. Of course

against this alternative is that red has a smaller energy/frequency than cyan and that you would often talk about stronger acids, making a low ph count as strong, not small! Finally the joke loses some value if it is still just a matter of big/small rather than actual properties of the penis that are being compensated for.

#1616: Lunch

December 14, 2015
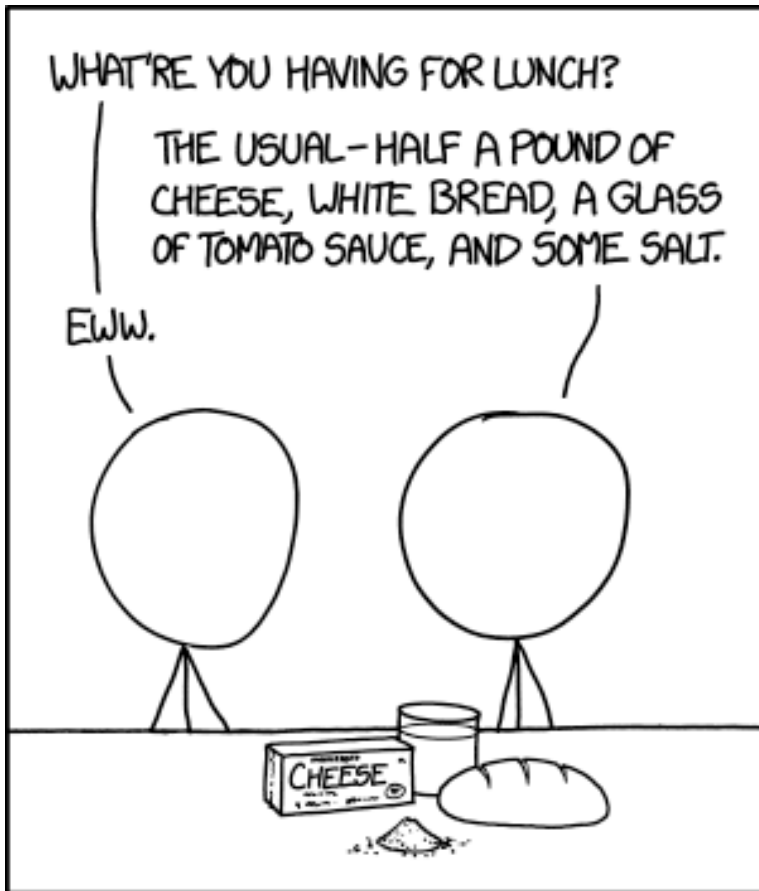
PIZZA SEEMS WAY GROSSER IF YOU
IMAGINE EATING JUST THE INGREDIENTS.

I'm trying to be healthier, so after I eat this brick of cheese, I'll have a spoonful of grease-soaked vegetables.

Explanation

This comic pokes fun at (and makes literal) a common argument used to assert that certain foods are quite unhealthy or unappetizing by pointing out how much of a particular ingredient the food contains. The argument is sometimes presented as "Imagine if you ate each of those ingredients separately". In this case, a pizza is broken down into its core ingredients, shown in their actual quantities: A large block of cheese, a loaf of bread, a glass of tomato sauce, and a pile of salt. Cueball (on the right) proposes to eat each of these ingredients individually and in their entirety—an act that many people (such as his Cueball-like friend to the left) may consider absurd or repulsive. This proposal is meant to change the reader's opinion of the final product—instead of enjoying a pizza, the reader may instead be reminded of the concept of eating a block of cheese and a pile of salt separately, and choose to eat something else instead.

This argument is effectively a counter to the practice of cooking, which combines individual ingredients into a more palatable product. Just as 1609: Food Combinations points out that combining two foods can make them sound less disgusting, this comic shows how separating out a meal can have the opposite effect.

The title text refers to a vegetable pizza, which is generally perceived as healthier than a standard pizza. Randall points out here that although vegetables may add some nutrients to the meal, they don't magically

reduce the other ingredients or their impacts. Additionally, the vegetables on a pizza may have been cooked in oil (or grease), or have absorbed the grease from the cheese as it melted, further impacting their potential benefits.

#1617: Time Capsule

December 16, 2015
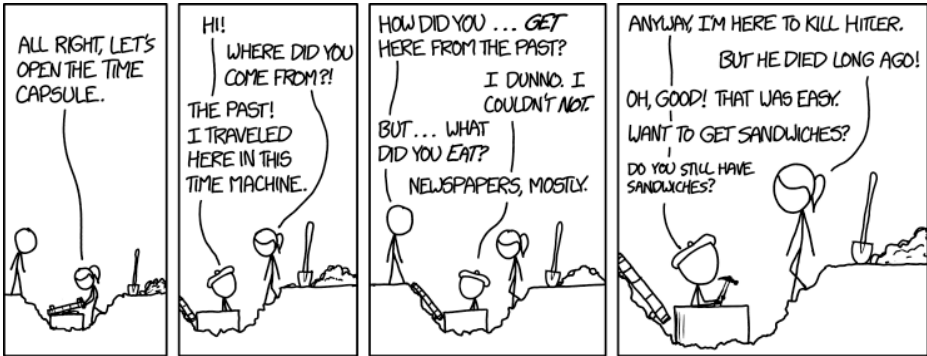
Oh no, I changed the future and now I'm disappearing! Wait, never mind, it was just my hat slipping down over my eyes.

Explanation

Cueball is watching Ponytail who has unearthed a time capsule, that must have been buried in the ground many years ago. A time capsule is a historic cache of goods or information, usually intended as a method of communication with future people and to help future archaeologists, anthropologists or historians. However, when she manages to open the capsule Beret Guy turns out to have been hiding inside while the capsule has been buried. It turns out that he has mixed up the purpose of a time machine and a time capsule; when Ponytail asks him where he came from he tells her: The past! I traveled here in this time machine. He cannot explain how he got there, but he claims that he could not have prevented it. This is a reference to the fact that you cannot avoid being pushed forward through time, see 1524: Dimensions. Beret Guy has also previously traveled to the future in a similar manner, see 209: Kayak.

Beret Guy claims he has been eating newspapers to survive; newspaper clippings are a stereotype content of time capsules. He also managed to live underground in the time capsule, which would typically be an airtight sealed box, for what must be assumed to be at least several years. Although some time capsules are meant to be opened after just a few years (10 or 25 years for instance) the plan should be that it is not opened for at least several years after it is created. So this comic is one more example of the strange powers of Beret Guy - i.e. living by eating paper and without breathing oxygen. But

he has before displayed patience enough to sit still for five years in 1088: Five Years.

Beret Guy mentions he got inside his "time machine" to attempt an assassination of Adolf Hitler (using the hammer he is holding). Traveling to the past in a time machine to assassinate Hitler is a common trope in speculative fiction, as a way to try to prevent the Second World War - however the scheme only works via travel into the past, to some time before Hitler rose to power and started the war, rather than "into the future" as Beret Guy did. Of course, when Beret Guy entered the "time machine" Hitler may still have been alive. If it was realized early enough what kind of threat Hitler was posing, a plan could have been devised, where Beret Guy traveled to a future time where it would become possible to kill Hitler, and where it would still make a difference if he did (however, it would have been more practical to just wait, though Beret Guy is never practical). Possibly, this is Beret Guy's origin story, and he came to the time of these comics in a "time machine."

Since he did not travel into the past, but forward in time by letting time pass normally, and since he did not get out until long after Hitler's demise, Ponytail can tell him that Hitler has been dead for a long time (70 years at the time of the comic's release). So if the capsule was opened on the day of the release of the comic, then he was 70 years too late. But of course the comic could be set at any time after the war, also in the future, as long as it would make sense to say that Hitler died long ago.

The fact that Hitler is already dead does not bother Beret Guy, on the contrary he is pleased, as he just realizes his job has already been done. What he thus fails to realize, is that he was probably supposed to kill Hitler before he got the Second World War started. This was the same type of failure made by Black Hat in 1063: Kill Hitler. Black Hat did actually travel 67 years back in time and killed Hitler, sadly it was in the last days of the war in 1945 just before Hitler would have died anyway, so it had no effect on history either, and the time machine was a one shot thing.

When he finds out that his job is done he asks Ponytail if they should get some sandwiches. It is a known feature of Beret Guy that he likes bakers and bread, though not specifically sandwiches. Realizing he is in the future he suddenly becomes aware that this concept may have been forgotten, and he asks if they still exist in this future. This is a reference to another comic where Megan has traveled through time in the same way as Beret Guy; see 630: Time Travel. It may also be a reference to the new version of Star Trek, in which Scotty's response to learning someone is from the future is "Do they still have sandwiches there?"

In the title text, Beret Guy becomes afraid that he will now disappear because he has changed the future in a way so he would no longer exist. A typical example would be to go back and kill your parents before you were born (or just prevent them from falling in love as in the movie Back to the Future). This creates a paradox where you will never be born, and thus cease to exist. Of

course the paradox is that you could thus not have prevented your birth in the first place, if you did not already exist. (Another good example of how this might feel is displayed in the movie Timecop). However, it turns out that in Beret Guy's case it was only his sight that was "disappearing", and that was only because his beret had fallen over his eyes. In any case the fear is baseless since he only traveled forward in time, not backwards, and thus could not have changed his own past. It is also unknown how his hat could slip over his eyes, as it is stapled to his head.

Time machines have been referenced in many xkcd comics, see the Time travel category.

#1618: Cold Medicine

December 18, 2015
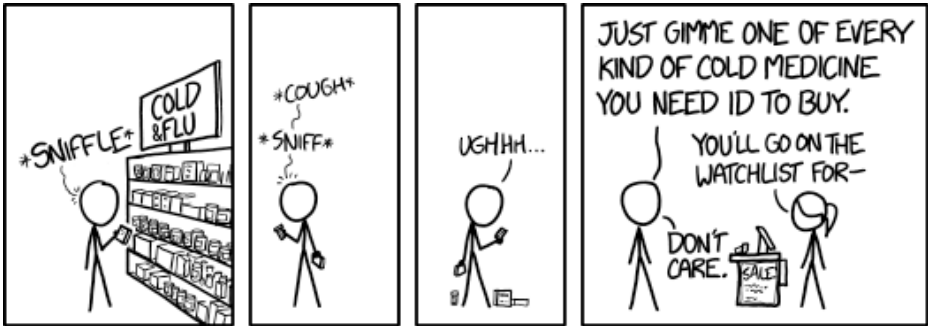
Seriously considering buying some illegal drugs to try to turn them back into cold medicine.

Explanation

In this comic Cueball is probably representing Randall who seems to have been suffering from a long lasting cold that he just can't get rid of. Two weeks before this comic Randall posted another comic about how a cold works: 1612: Colds. This is also supported by the way the title text is phrased to make it sound like something Randall writes, disconnected with the action in the comic (see below).

In the comic Cueball is evidently suffering from a cold and he is searching the shelves labeled cold and Flu at a pharmacy for any kind of cold medicine (hence the title), to alleviate his symptoms. Note that this is all he can hope for, as there are still no cure that really helps getting rid of the cold any faster. All medication can do is help relieving the symptoms until the body's own immune system takes care of the relatively harmless cold virus.

After looking at several different options Cueball is clearly unsatisfied with what he finds. Either he doesn't feel that any of the unmonitored drugs available on the serve-yourself-shelf is useful, or he is actually too sick to properly ascertain which medicine he needs. In the end he approaches the counter and asks the pharmacist (Ponytail) to give him one of every kind of cold medicine which requires an ID to purchase. Two years later Randall finds a solution for Cueball's problem with a new cold medicine with only active ingredients, including among other all the active ingredients from all

the cold medicines on the market, see 1896: Active Ingredients Only.

Ponytail tries to warn Cueball of another danger, that by simply purchasing so much cold medicine he would end up on a law enforcement watchlist, presumably one of the government agencies (DEA, FBI, CIA etc.) But she never gets to finish her sentence because the sick Cueball is beyond caring and tells her this.

In the USA, cold medicines containing pseudoephedrine are kept behind the counter and IDs purchasing them are monitored, because pseudoephedrine can be used to make the scheduled drug methamphetamine or meth (a more hydrophobic - and thus potent - version of amphetamine). However, it is also an extremely effective decongestant (a pharmaceutical drug that is used to relieve nasal congestion/plugged nose), much more so than the common substitutes such as phenylephrine and oxymetazoline which have no clinically proven decongestant effect.

This could be one reason why Cueball just requests all kinds of cold medicines of amongst other this type; he does not appear to care what exactly he is purchasing, believing that his one criterion will provide him medicine powerful enough for his illness. It may also be that he is just too sick to care or realize that this will arouse suspicion of him being a drug dealer, or to recognize the need to select only one medication of these type.

The title text seems to be Randall's own comment on

how badly he is affected by his cold. He thus, humorously, suggests that he is now ready to purchase illegal drugs (this would then be meth) in order to turn it back into a cold medicine (i.e. pseudoephedrine). This would not be safe to do, but may be a reference to this spoof paper: A Simple and Convenient Synthesis of Pseudoephedrine From N-Methylamphetamine, a take on the long-going joke about the recent difficulty in obtaining pseudoephedrine, i.e. it is now easier to get your hands on the illegal drug made from it.

It is a humorous exaggeration of how far Randall is willing to go to get the best cold medicine, and the potency of the drugs needed to treat his apparently debilitating illness. There are many illegal drugs that when first synthesized were planned to be used as a medical drug, but then later abused by drug addicts, but given the subject of the comic, the title text obviously refers to meth.

Randall continued in the medical world with the next comic: 1619: Watson Medical Algorithm.

#1619: Watson Medical Algorithm

December 21, 2015

A GUIDE TO THE MEDICAL DIAGNOSTIC AND TREATMENT ALGORITHM USED BY IBM's WATSON COMPUTER SYSTEM

Due to a minor glitch, 'discharge patient' does not cause the algorithm to exit, but instead leads back to 'hunt down and capture patient'.
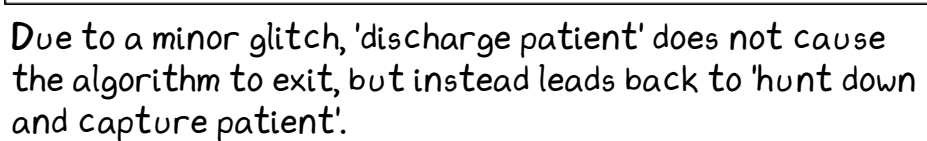
Explanation

IBM's Watson is a natural language system designed to answer questions posed by humans. Recently, IBM has extended Watson to act as a clinical decision support system, using image analytics to aid physicians in medical decision making. In this comic, Randall uses a flowchart (as he often does) to represent a guide to the algorithm used by Watson, including bizarre and horrifying techniques including surgical alteration of a patient to match a height and weight chart or squeezing the patient to make sure fluids come out of them. Like 416: Zealous Autoconfig, this comic pokes fun at a rigid, poorly-designed setup that ends up potentially doing more harm than good.

Modern medicine involves both standard processes and clinical judgment based around years of advanced training. An algorithm like this would have to be incredibly complicated in order to simulate the clinical judgment of a good doctor. However, some procedures are not normally used, and some would obviously cause damage.[citation needed] Below is a detailed description of each step, but here is a list of some of the more strange steps:

- The algorithm depicted treats a patient as more of a machine or mechanical system than a living being, especially through decisions such as:

Injecting oxygen into patients with low oxygen

saturation, rather than administering an oxygen mask or treating the root cause.

Removing and inspecting a skeleton, then diagnosing the patient's condition with a bone count. This is likely a reference to A Serious Case Of Spookiness from the Buttersafe web-comic, a comic Randall links to from below the comics on xkcd .

In the book Thing Explainer there is an explanation Colors of light for the electromagnetic spectrum, where Ponytail as a doctor looks at a full body x-ray of Cueball and exclaims that ... It looks like your body is full of bones to which Cueball replies Oh no! Is there any cure? Well if he meets Watson he might have them all removed... This comic came out about a month after the book so it may be viewed as a kind of reference to the problem with too many bones.

Dissecting a doctor "for parts" after consulting them for advice.

Removing extra limbs from a patient if the count is 100 or more (This might be a reference to different number systems used in computers, as 100 is read in binary as four.)

Determining whether the "build environment" of the patient is sane. This is most probably a reference to the configure script used in the GNU build system, which emits "checking whether build environment is sane" as one of its status messages. This is also referenced in 371: Compiler Complaint.

Rinsing the whole patient with a saline solution.

Removing organs from a patient regardless of response to an organ donation request.

- Other decisions appear to be entirely unrelated to the conditions upon which they are predicated:

If the patient doesn't rate their pain on a scale from 0-10, sequence their genome, apply a tourniquet, and perform an autopsy

If the patient's phone's battery is low, defibrillate until the battery is charged, sync photos, then administer general anesthesia

If the patient is successfully comforted after an oxygen injection, check their medical history and apply skin grafts

If green fluid is released from the patient, begin to cauterize

If the patient has less than 100 limbs, check their Vitamin D level

Although there are two options where the patient is discharged the patient should be very lucky to make it to one alive. The only survivable route requires the patient to be injecting with oxygen, which is typically lethal. The patient would also experience multiple unnecessary operations, which hopefully do not last long enough for their vitamin D levels or their phone battery to decrease significantly. The option at the bottom left is only reached after your skeleton is removed (and nothing is mentioned about putting it back, even if that would

help).

The other discharge option is to the right, three boxes down, and can only be reached if you survive having an oxygen saturation of less than 50 % (less than 80-90 % can be a serious problem, see table below), and a very dangerous oxygen injection. Then you have to have a skin graft and a good D vitamin level. It is also best that you have a fully charged phone else you will be subject to defibrillation (which may very likely kill you, if it will continue until your phone is charged to above "low" level - which is probably not even possible). You can also reach this discharge option another way, but that would only be after your organs were removed... But if you get through this you could reach the discharged option alive. Sadly there is a little glitch mentioned in the title text:

The title text implies that, if the patient is so lucky to ever reach one of the two places with the option "discharge patient", a minor glitch will cause the program to go back to the hunt down and capture patient option which thus force the patient and the program to repeat the process again in an infinite cycle, that will only end once the patient give another rating than 0-10 of their pain level on the 0-10 scale. Then the program will start to sequence their genome, then apply a tourniquet and finally perform an autopsy on what will, in the end, for certain be a deceased patient; but maybe the patient was still alive when the autopsy began. This will finally cause the patient to leave the cycle as a corpse. If the patient dies before giving a different option, the machine could get stuck, as it will never receive any answer to the pain

level question. It could also get stuck trying to charge the patients phone battery by defibrillation.

One potential way to survive is to keep answering "nine" on the pain level question. Another possible exit would be spitting, drooling or sweating enough to register in the "fluid coming out of patient" stage while not bleeding or having snot fall out, causing the algorithm to freeze due to not having a response for clear liquids.

This is the second comic in a row about health issues with the last comic being 1618: Cold Medicine.

Explanation of steps[edit]

#1620: Christmas Settings

December 23, 2015
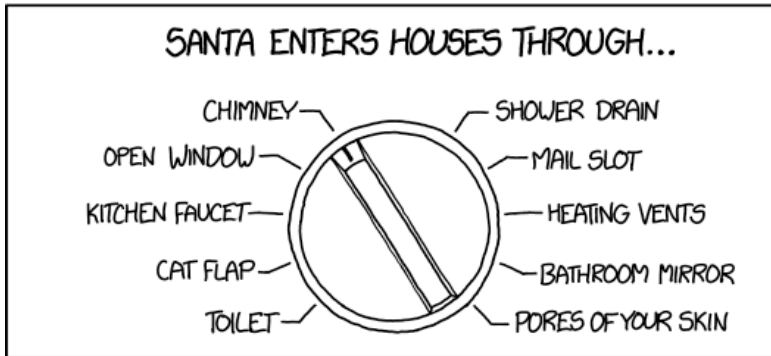
Explanation

The first of two Christmas comics in a row, as it was followed by 1621: Fixion. In this comic Ponytail is showing Megan around a facility where they are now reaching the "Universe Control Panel", and Ponytail points out the first panel and tells that these dials control Christmas.

Presumably, the control panel is a set of panels with several dials each to control the entire universe, and anyone having access to a room with these controls would from our point of view be in a Godlike position. If such a room did exist, it would most likely be situated outside our universe. Here it would be easy for Randall to use the panel to make physics references, with dials to control the specific size of fundamental constants of the universe such as the speed of light in vacuum or the Planck constant. Instead he chooses a more comedic angle in the spirit of Christmas (as he usually does in comics released close to said holiday, this one being released on December 23rd).

We are shown only one of the dials on the Christmas control panel, the one that controls how Santa Claus enters people's houses. The Santa enters houses through-dial has ten different possible settings. The one it's set to at this point of the comic is the traditional chimney. Among the other nine there is only one even more reasonable option, open window, but surprisingly there is no option called door. The other eight options,

however, are increasingly weird or even impossible (though of course not for Santa, who can deliver a billion presents in one night and fly in a sleigh drawn by flying reindeer). These options ranges from the feasible like mail slot, heating vents or cat flap, to the impossible/ridiculous (some even disgusting) such as kitchen faucet, shower drain, or toilet, to the truly magical bathroom mirror, to the downright unpleasant pores of your skin. (See 555: Two Mirrors regarding the mirror version.)

In a quite unfortunate turn of events, Megan trips and catches herself on the Santa dial, messing it up by clicking it twice (if one click equals changing to the next adjacent option, in any initial direction, then now it must be set either be "kitchen faucet" or "mail slot"). To make matters worse, when Megan asks what it was set to before so as to undo the mishap, Ponytail tells that she has forgotten (possibly not being unaffected by all such changes). So they cannot put it back right.

The dial is shown in the comic only for the reader's benefit, because as Megan tripped up before reaching it and never looked at it. As Ponytail is showing her around, it must have been Megan's first visit here. The reason why Ponytail cannot remember to which option the dial was set before is most likely because she is not part of our universe (the control panel is located outside), and also she is probably not the creator of the control panel. She is clearly disturbed when Megan falls on the control panel (she holds up her hand to her mouth), and might not want to have to tell her boss about this mess

up. It is possible that by changing the dial, Megan's memories of Santa's entry methods are altered, and so whatever position the dial now rests at would seem normal to her. (This could mean that history has no effect outside the universe, so the single dial controls past, present, and future Santa methods. Perhaps the dial was formerly something more logical than a chimney, like "open window," and indeed we are the ones who now live in the altered universe.)

Then, as so often seen with human behaviors (if they are indeed human beings at all?), Megan says she will simply take a wild guess and hope she get it right. As the only thing she really knows is that it is not on the right setting now, there is only 1/9 chance that she will get it right, assuming she will at least change it away from the setting it ended up on. Since the comic was released just before Christmas, here a prank is played on the reader/children who believe in Santa Claus. Now that the dial setting is probably changed, one can expect Santa to enter the house in a different way. So the believer could stay up and try to find out what way it would be. The comic might also be a joke on real-life controls, physical or virtual, often having no clear "default" value. The "Universe Control Panel" would later be featured in 1763: Catcalling as the "Universe Control Console" instead.

The title text continues the idea of a universe control panel by showing another possible dial, Sound dogs make, ranging from normal (barking) to cat sounds (hissing, very embarrassing for a dog), "lightsaber noises",

and speech to swearing. This dial would thus give the same option of changing the expected vocal response of the dog away from (our norm of) barking, as with the other dial for the way Santa enters the house. In popular culture, talking dogs are a commonly used trope; in contrast, swearing dogs are few, the most famous being Triumph, the Insult Comic Dog, a puppet created by Conan O'Brien and Robert Smigel and performed by the latter.

Options for Santa[edit]

The table below explains the ten possible settings for Santa enters houses through...; starting with the originally chosen standard option and going clockwise through the rest:

Options for dogs[edit]

The table below explains the five possible settings for Sound dogs make; starting with the current and continuing with the order in the title text:
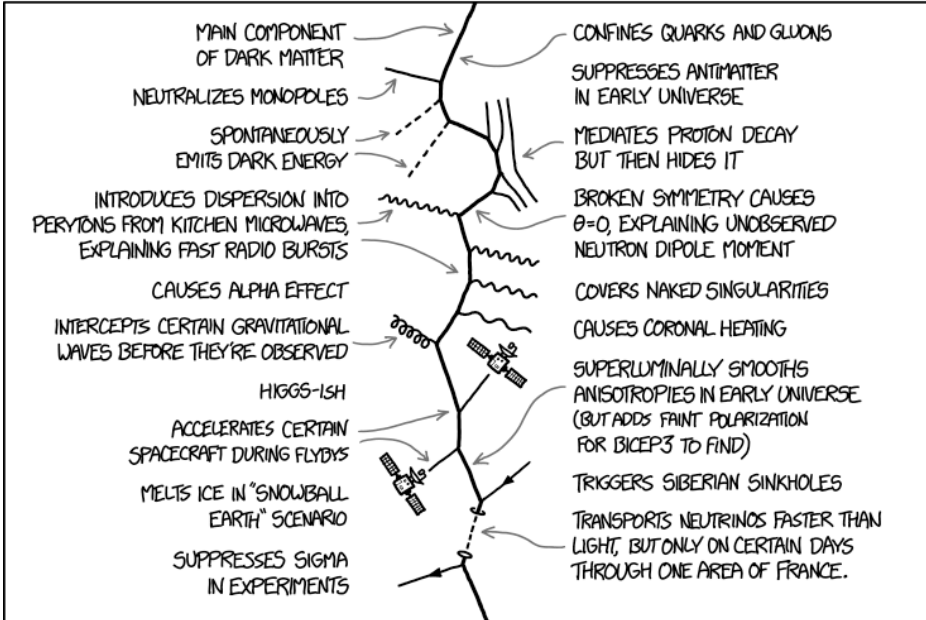
#1621: Fixion

December 25, 2015

A CHRISTMAS GIFT FOR PHYSICISTS:

THE FIXION

A NEW PARTICLE THAT EXPLAINS EVERYTHING

MAIN COMPONENT OF DARK MATTER

NEUTRALIZES MONOPOLES

SPONTANEOUSLY EMITS DARK ENERGY

INTRODUCES DISPERSION INTO PERYTONS FROM KITCHEN MICROWAVES, EXPLAINING FAST RADIO BURSTS

CAUSES ALPHA EFFECT

INTERCEPTS CERTAIN GRAVITATIONAL WAVES BEFORE THEY'RE OBSERVED

HIGGS-ISH

ACCELERATES CERTAIN SPACECRAFT DURING FLYBYS

MELTS ICE IN "SNOWBALL EARTH" SCENARIO

SUPPRESSES SIGMA IN EXPERIMENTS

CONFINES QUARKS AND GLUONS

SUPPRESSES ANTIMATTER IN EARLY UNIVERSE

MEDIATES PROTON DECAY BUT THEN HIDES IT

BROKEN SYMMETRY CAUSES θ=0, EXPLAINING UNOBSERVED NEUTRON DIPOLE MOMENT

COVERS NAKED SINGULARITIES

CAUSES CORONAL HEATING

SUPERLUMINALLY SMOOTHS ANISOTROPIES IN EARLY UNIVERSE (BUT ADDS FAINT POLARIZATION FOR BICEP3 TO FIND)

TRIGGERS SIBERIAN SINKHOLES

TRANSPORTS NEUTRINOS FASTER THAN LIGHT, BUT ONLY ON CERTAIN DAYS THROUGH ONE AREA OF FRANCE.

My theory predicts that, at high enough energies, FRBs and perytons become indistinguishable because the detector burns out.

Explanation

The second Christmas comic in a row, the first being 1620: Christmas Settings.

This comic was released on Christmas day as a present from Randall to all physicists. It introduces a new particle, the Fixion, which explains everything. The word "Fixion" can be read as a pun: Either it can mean something like "fix-i-on," with "-on" being a suffix for many particles, and this particle being able to "fix" things. Coincidentally it's also very similar to the word "fiction" aptly describing its wish fulfilment nature.

In physics, there are still many big questions and mysteries. There are many phenomena which don't seem to fit, and we don't know how to explain yet. The "Fixion" is satirically presented as a particle which acts as a Deus ex machina, (see also tvtropes), which solves all of these mysteries without any serious fundamental reasons.

The style of the chart suggests a Feynman diagram - an easy way of drawing particle interactions. Every time there is an interaction, the main central Fixion-line changes direction. Typically, fermions (the "solid" particles like electrons and quarks) are shown with solid lines, photons (and generally the weak-force-carrying bosons) are shown with wavy lines, gluons with spiraling lines and other mediating particles (such as pions in the nuclear force, or the Higgs boson) with a dotted line. Randall obeys these rules only very loosely, which makes

sense - many of the things involved in this Feynman diagram are either so theoretical that they have no widely used standard representation, or would never appear in a sensible diagram (spacecraft, for instance). All mentioned types of lines - and even more types - are presented in the diagram. All that the Fixion does is described in the table below.
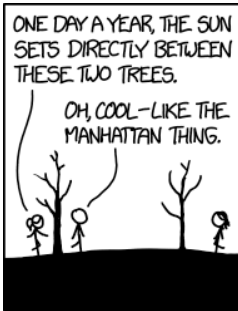
The title text is a continuation of one of the jokes already mentioned in the main comic (fourth phrase from the top to the left) about Fast radio bursts (FRBs) and perytons. See explanation in the last entry in the table below.

Table of Phenomena[edit]

- Below, all the phenomena mentioned in the comic (and in the title text) have been listed and described.
- The order is the top left phenomenon first, and then alternating between right and left down to the bottom and then the title text at the end.

#1622: Henge

December 28, 2015

ONE DAY A YEAR, THE SUN SETS DIRECTLY BETWEEN THESE TWO TREES.

OH, COOL—LIKE THE MANHATTAN THING.

WAIT, ISN'T THAT TRUE EVERY DAY FOR PRETTY MUCH ANY TWO TREES?

SHH, HERE IT COMES!

WAIT, WHAT?

OK, GOT THE BAG?

YUP, GRAB IT!

WE'RE GONNA BE *RICH!*

I've got the Craigslist post ready to go! I wasn't sure what category it should go in, so I listed it as property and put that it has 'good sun exposure.'

Explanation

Ponytail and Cueball walks in from the left to meet Megan who comes from the right. They are walking in between two trees while Ponytail tells Cueball that One day a year, the sun sets directly between these two trees.

Cueball's reply: Oh, cool - like the Manhattan thing, is a reference to Manhattanhenge, a phenomenon occurring twice a year that causes the setting sun to align with the east-west streets of the main grid of Manhattan, New York, causing a very special light display. Manhattanhenge is itself named after Stonehenge, an ancient monument consisting of several large stones, where the heel stone and the embanked avenue are aligned to the sunset of the winter solstice and the opposing sunrise of the summer solstice (thus creating on purpose the effect seen today in Manhattan, on specially intended dates). Hence the title of the comic, which was released less than a week after the winter solstice which fell on 2015-12-22.

After a beat panel Cueball, however, realizes that one could make the setting sun line up with almost any two arbitrary trees on any given day. This is due to the fact that the trees are effectively zero-dimensional points on the surface rather than one-dimensional lines like street grids. Any two trees that are close together with one tree further north would allow a setting sun to set between them; the viewer of the sunset could simply move themselves to make the alignment work. This is opposed

to Stonehenge/Manhattanhenge, which requires the sun to align with a straight line, and only works on a few days a year.

The twist comes when Ponytail and Megan actually attempt to capture the setting sun with a butterfly net, as it is revealed that the sun is somehow setting at the actual point between the two trees rather than behind the trees when viewed from the east side. This is of course not possible in real life,[citation needed] but in the comic's last panel and in the title text the girls continue with their successful though surrealistic plan.

If this was indeed our Sun that they had somehow shrunk and cooled enough to captured with a butterfly net, transfer to a bag and bring it home, this would on xkcd terms be no more strange than many of the strange powers of Beret Guy. If this would indeed happen, then since Earth and the rest of the solar system is now missing its central star there would be a ton of problems for everyone on Earth. So the girls would probably be able to get a lot of money in ransom for releasing the sun, but in the title text it turns out that they are just going to sell the Sun on-line.

Alternatively this is not the Sun, but just a small sun-look alike, maybe a ball lightning which might actually be able to behave like this (though one would not be able to capture it in a bag).[citation needed]

Or the girls simply play a theatrical show for the reader. They know the comic's panel orientation, reader's

position and the view projection. So they position themselves like the two trees between reader and the distant sun to look like they capture it with a butterfly net and a bag.

The title text refers to Craigslist, a web site where the girls plans to offer the sun for sale in hopes of getting rich. Craigslist is a classified advertisements website with sections devoted to jobs, housing, personals, for sale, items wanted, etc. One of the girls tells that she was uncertain as to under which category she should list a "Sun for sale". But she put it under property (as in real estate). To advertise the "property" she put "that it has 'good sun exposure", a common description of real estate. Being the sun itself you could claim that it is well located compared to the Sun, but it will never really see any sun light itself as the only "sun" light that hits the Sun is the light from other stars which is very dim.

The title text may also be a reference to a woman who was stopped by eBay after attempting to sell plots of "land" on the Sun on the site.

Lately Randall has had his characters catch several things (but never butterflies) with a butterfly net. The next instance of butterfly nets can be seen in 1635: Birdsong, released less than a month after this comic's release date, wherein a bird is chased with a net.

#1623: 2016 Conversation Guide

December 30, 2015
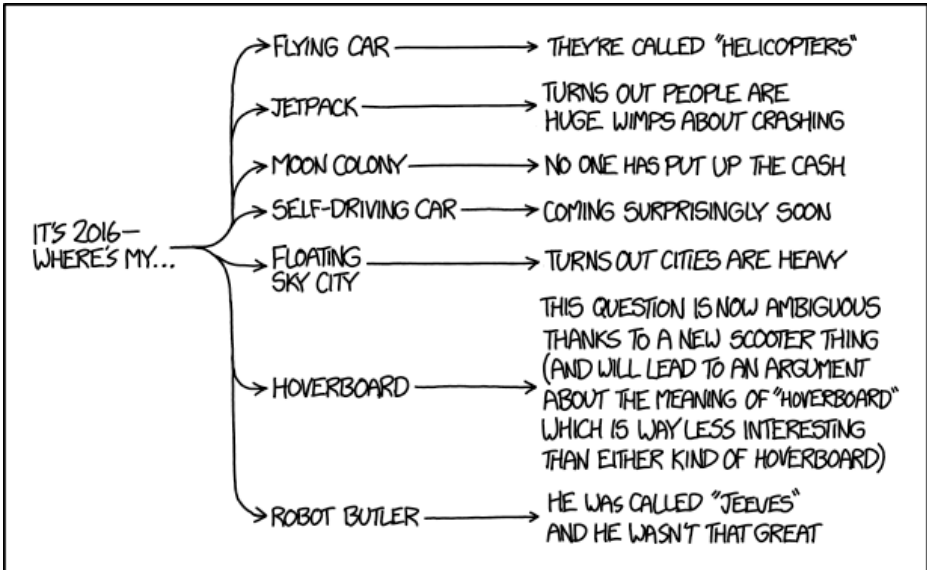
The real loser in an argument about the meaning of the word 'hoverboard' is anyone who leaves that argument on foot.

Explanation

As each year turns (or other milestone dates, perhaps set out in popular fiction) it is common enough to remember that what is now the present was once considered the future!

This New Year comic, published just prior to the start of the New Year, 2016, aims to clarify a number of the things one might have expected by now. (Another New Year comic followed on New Year's Day: 1624: 2016, making it two in a row with titles beginning with 2016...) The classic target of personal futurology is the ability to levitate or fly, to varying degrees. This topic was discussed before in 864: Flying Cars, where Megan suggests that the real advances in futuristic technology are in computers and electronics, rather than methods of flying.

Various forms of flying car have had varying degrees of success (although it's debatable whether these examples are actually cars or just small airplanes), but the comic points out that the regular helicopter is as close as most of us would ever get to levitating personal vehicles.

"Where's my jet pack?" is a common trope. There are various systems and analogues that could be considered jet packs in some sense, but devices to let individuals fly on Earth would be extremely dangerous, even if they could be made practical. A functioning jetpack would risk elevating people to dangerous altitudes while

potentially accelerating them to dangerous velocities, make it both difficult and dangerous to steer. The high likelihood of fatal crashes means that a viable product is unlikely to ever exist - unless technologies will allow to augment humans (such as genetic engineering or cybernetics) to such degree, that they could ram the ground at top speed and remain unharmed.

The basic science and engineering exists exists to build some form of permanently manned settlement on the Moon, but doing so would be extremely expensive. The technology to exploit lunar resources, either for construction or life support, has not yet been developed, so all equipment and supplies would need to be continually transported from Earth. Commercial potential of such a base would be extremely limited, and no organization or group has been willing to spend the kind of money it would take.

Randall notes that these are "coming surprisingly soon." Self-driving cars have not become nearly as ubiquitous as was frequently predicted in 2016. As of 2024 (9 years after the release of this comic), there are various forms of self-driving with various degrees of advancement. The most impressive would be Tesla's full self-driving beta, which is capable of performing acceptably in most situations, except for parking lot navigation. Other than Tesla, companies such as Google, Waabi, and Euler Motors are working on self-driving vehicles, though Tesla remains the most well-known amongst the general public. All these vehicles still require a human driver present.

Self-driving cars has become a recurring topic on xkcd and they were mentioned again already in the title text of 1625: Substitutions 2 just two comics after this one.

Various science fiction sources imagined the idea of floating cities (e.g. Bespin, Mortal Engines Quartet). In reality, this seems highly unlikely to happen in the foreseeable future. Absent some form of levitation technology that doesn't even exist as a concept yet, the only ways to keep things floating inside a planet's atmosphere are to make use of either buoyancy or continually providing thrust and/or lift. But "cities are heavy". The amount of mass that any kind of city would have would require either an implausibly large volume to float by buoyancy, or an incredible amount of energy (continually provided) to supply thrust or lift. With any foreseeable technology, that's unlikely to ever be practical.

The levitating Hoverboard has been popularised by the Back To The Future franchise of films, with several attempts to fully emulate such a device with air-blast or magnetic levitation, but the term "Hoverboard" has ended up being applied to a Segway-like personal transport system that has at least become a mass-produced device (albeit with a number of safety concerns) even if it doesn't fly or levitate. The very concept of the hoverboard was therefore predicted to be reduced mostly to arguments between opposing camps of opinions; and then, in the title-text, the conclusion that giving up and resorting to old-fashioned walking is inferior to any of the possible alternatives.

A long-held science fiction vision is a robot (presumably humanoid), that can perform household tasks, taking that burden off people. Randall mentions "Jeeves", saying "he wasn't that great". This is presumably a reference to the early search site Ask Jeeves, which used a stereotypical butler name. The concept was that the search engine could take on tasks for you, much as a butler would. However, it was only a search engine, incapable of performing any physical tasks, extremely limited in the non-physical tasks it could perform, limited in its accessibility, and not even a particularly good search engine in the first place.

In a broader sense, there do exist an increasing number of automated systems to do specific household tasks (such as vacuuming), and voice-activated systems that can perform virtual tasks, like keeping schedules and looking up information, are increasingly widespread. To date, though, a generalized robot that can perform variety of physical tasks does not yet exist in a practical form. Robots (both humanoid and otherwise) that can move and operate semi-autonomously are under development, but are neither sufficiently advanced nor sufficiently cost effective to replace human labor in most instances.

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